ANNUAL REPORTS

2

OF THE

NEBRASKA

State Horticultural Society.

1878 AND 1879.

Made to the Governor, as required by Section 9 of "An Act for the support and maintenance of the State Board of Agriculture and State Horticultural Society.

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To His Excellency, Governor Albinus Nance:

In compliance with the requirements of section nine of "An Act for the government, support, and maintenance of the State Board of Agriculture and State Horticultural Society," the accompanying report is hereby respectfully submitted.

Very respectfully,

ROBT. W. FURNAS,
President.

D. H. WHEELER,
Secretary.

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TABLE OF CONTENTS

Applications filed in office of State Board of Irrigation.......258
Alphabetical list of claims and applications arranged by streams...164
Character of principal streams of Nebraska—O. V. P. Stout..143
Claims filed in office of State Board of Irrigation, Div. 1......214
Claims filed in office of State Board of Irrigation, Div. 2......240
Claims filed in the several counties............................280
Dawson county, History of irrigation in—H. O. Smith........ 27
Daugherty, M. A., "The Struggle and Triumph of Irrigation in Nebraska.".. 50
Development of the Underflow—W. R. Akers................. 81
Description of gaging stations—O. V. P. Stout................ 93

Discharge table of

- Elkhorn river at Norfolk..................................116
- Frenchman river at Wauneta.............................101
- Frenchman at Palisade...................................102
- Loup, North, at St. Paul..................................110
- Loup, Middle, at St. Paul.................................112
- Loup river at Columbus...................................114
- Platte river at Columbus..................................109
- Platte, North, at Camp Clarke............................106
- Platte, North, at North Platte............................107
- Republican River at Superior.............................105
- Republican, North Fork, at Benkelman..................104

Discharge at gauging stations, measurement of..............117
Discharge of various streams...................................122
Discharge through rectangular and vertical openings—E. T. Youngfelt 138
Duty of Water—W. R. Akers.................................... 71
Flow of water through vertical openings and over weirs—E. T. Youngfelt 131
Frenchman river, Report on—Adna Dobson....................160
Howell, R. B., Report of.. 23
Lincoln county, History of irrigation in—E. F. Suberger...... 43
Lodge Pole creek, Description of—Adna Dobson..............151
Reminiscences and Realization of Neb.—Edward McLernon.. 58
Report of W. R. Akers, secretary.............................. 9
Report of R. B. Howell, ex-secretary.......................... 23
Report of E. T. Youngfelt, assistant secretary................ 87
Report of Adna Dobson, under secretary.......................149
State Irrigation Association.....................................309

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*Dead.

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Stephen Hobson, Mt. Pleasant, Cass County.
Sam'l Barnard, Table Rock, Pawnee County.

METEOROLOGY IN ITS RELATIONS TO HORTICULTURE.

Prof. S. R. Thompson, Lincoln.

ENTOMOLOGY IN ITS RELATIONS TO HORTICULTURE.

Prof. S. Aughey, State University, Lincoln.

ORNITHOLOGY IN ITS RELATIONS TO HORTICULTURE.

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GEOLOGY IN ITS RELATIONS TO HORTICULTURE.

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James T. Allen, Omaha.

VEGETABLE CULTURE.

H. Craig, Ft. Calhoun.

ORNAMENTAL GARDENING.

E. H. Burches, Brownville.

CONSTITUTION, BY-LAWS, ETC.

CONSTITUTION.

1. This society shall be called the NEBRASKA STATE HORTICULTURAL SOCIETY, and shall have for its object the promotion of Pomology, Arboriculture, Floriculture, and Gardening.

2. The Society shall hold at least two meetings each year—one at the time of the annual fair of the State Board of Agriculture, and the other at the call of the president.

3. The officers of the society shall be a President, First and Second Vice-Presidents, Secretary, and Treasurer.

4. The management of the Society shall devolve upon a Board of Directors, to be composed of the President, Vice-Presidents, Secretary, Treasurer, and three members of the Society to be elected at the annual meeting in January of each year.

5. The Society shall not contract debts, except by a vote of two-thirds of its members.

6. The acceptance of the office of President, Vice-President, and Secretary, being filed with the Secretary, shall be considered as qualifying.

7. This constitution may be amended or altered, at annual meetings, by a vote of two-thirds of the members present.

8. The Treasurer shall be qualified by giving bonds in twice the amount of funds expected to come into his hands.

BY-LAWS.

1. The officers of this Society shall be elected at the January meeting.

2. The officers of this Society shall hold their respective offices until their successors are elected and qualified.

3. The first business of the meetings of the Society shall be on each morning, the reading of the minutes of the previous day's proceedings, and submitting the same to the approval of the meeting.

4. The President (and in case of his absence, the Vice-President), Secretary, and Treasurer, shall constitute an executive committee, who shall perform any business deemed necessary for the benefit of the Society.

5. The payment of one dollar shall constitute the annual membership, which shall cease on the day preceding the first day of the annual meeting of the Society, in January. Or the payment of five dollars at one time will constitute membership as above for six years.

6. There shall be appointed by the President, at the time of his election at the annual meeting in January of each year, a standing committee of five from each judicial district in the State, whose duty it shall be to make up and forward to the Secretary, before or at the annual meeting in January, such reports as have immediate connection with the condition of fruits, progress in their culture, and any other topic relating to horticultural progress in their respective districts, their reports to be condensed for publication.

Also a standing committee of three on Synonyms.

Also a standing committee of one in each of the following: Meteorology in its relations to Horticulture, Entomology, Ornithology, Geology, Forestry, Vegetable Culture, Ornamental Gardening.

7. These By-Laws may be amended at any general meeting of the Society by a majority of the members present.

REGULATIONS.

Fruits must be grown in the State and by the exhibitor, and be as correctly named as possible, and labeled.

Fruits and Flowers competing for same premiums must be arranged, as near as may be, together.

"Collections" must embrace at least five different varieties, and not less than five specimens of each variety, and arranged in a body or group.

The "Collection of Fruits," Lot 1, may be separate and distinct from minor exhibits, or may be composed of them, as exhibitors may elect, but must be exhibited by the parties growing, or in the name of the county in which grown, or in the name of the county Horticultural or Pomological Society of the county in which grown.

"Seedlings" must be characterized for excellence, equal, at least, with those of established varieties of same grade and season, before being entitled to recognition by this Society.

Ten per cent will be deducted on all premiums awarded as an entrance fee.

RULES FOR JUDGING FRUITS, WITH A SCALE OF POINTS.

GENERAL RULES.

1. In all cases the judges are to be governed by the letter and spirit of the schedule under which the exhibitors have made their entries. The general appearance of the fruit, care in its selection, and taste displayed in its arrangement or grouping, each entry being distinctly separated from the rest, these are all elements of the highest importance and should receive appropriate consideration by the committee.

2. In every group, whether the single plates, the threes, fives, tens, or larger collections of fruits, there should never be more than one plate of any variety in any one group. Lists of the names of the varieties exhibited should accompany each group, and must be attached to the entry card, and have a corresponding number and designation—with or without exhibitor's name, according to rule.

3. The *same plates* of fruit *cannot* compete for different prizes, except in the grand collection of largest display (sweepstakes); though the several entries for the best ten, best five, or other numbers, and the best plate, may embrace the same varieties, but

not the same plates of specimens; in each case they must be duplicates, and in sweepstakes they will count for a single variety.

4. When the schedule prescribes the number of each kind, usually three or five, to be placed on exhibition, the exact number must be presented, neither more nor less.

5. In general collections of fruit by individuals, counties, or otherwise, when the several species of fruits are specified in the schedule, they must all be presented, or the collections may be passed by the committee.

6. In all cases, but more especially in the Display, or Greatest and Best Collections, *number* of varieties is the *prima facie* test of superiority, other things being equal; but quality, relative value, their perfect condition, and tasteful appearance will be considered, and should rank thus respectively:

1. Number.
2. Quality or value.
3. Condition, approaching perfection.
4. Taste in the display.

To illustrate: on a scale of ten—

No. 1 may have 100 plates, the largest collection	10
Quality: some inferior varieties	5
Condition of fruits: rather poor	5
Taste in display	5
Total	25

No. 2 may have 90 plates, ranking	8
Quality: superior in most, ranking	8
Condition of fruit: perfect, ranking	10
Taste in the arrangement: good, ranking	9
Total	35

No. 2 would in this case take the premium.

In the case of single plates of the several kinds named, or in a competition for the best plate or basket of any kind of fruit, we may consider condition, form, size, color, and texture with flavor. On the same scale we may have two entries to decide thus:

No. 1.

Condition	Perfect	10
Form	Abnormal	8
Size	Overgrown	8
Color	Perfect	10
Texture and flavor	Superior	10
Total		46

No. 2.

Condition	Stem lost	8
Form	Perfect	10
Size	Uneven	6
Color	Too pale	6
Texture and flavor	Insipid	5
Total		35

This scaling might be used in deciding between any number of single plates of designated varieties competing with one another for the best plate of any kind, or for the basket premiums, with assortment or single variety, according to the words of the schedule.

SPECIAL RULES.

The judges should have an ideal standard of perfection in all cases, made up of the following particulars:

1. The *condition* and general appearance of the fruit—which should be in its natural state, not rubbed nor polished, nor specked, bruised, wormy, nor eroded—with all its parts, stem, and calyx-segments well preserved, not wilted nor shriveled, clean.

2. The *size* in apples and pears, particularly, should be average, and neither overgrown nor small; the specimens should be even in size.

3. The *form* should be regular or normal to the variety, and the lot even.

4. The *color* and *markings* or the *surface* to be in character, not blotched nor scabby.

5. When comparing different varieties, and even the same kind, grown on different soils, the *texture* and *flavor* are important elements in coming to a decision. Five points.

In the class Peaches, Plums, etc., the important elements are size, form, color, flavor, and condition. Five points.

In Grapes we must consider and compare the form and size of the bunches, the size of the berries, their color, ripeness, and flavor and condition. Five points.

In currants we shall have to examine the perfection and size of the bunches, and of the berries their flavor and conditions. Three points.

In Gooseberries we shall look to the size, color, flavor, and condition of the fruit. Four points.

In judging Cherries we have as our guide the size and form, the color, flavor, and condition. Four points.

In judging Strawberries we shall compare the size and form, color, flavor, firmness, and condition. Five points.

They should be shown with stem and calyx.

Raspberries may be shown with or without the calyx. In this fruit we shall have to judge of the size, color, flavor, and condition. Four points.

Blackcaps must have size, color, flavor, and condition. Four points.

Blackberries must be tested according as they present size, color and form, flavor and texture, and condition. Four points.

In all cases it is well to have a convenient scale of comparison, for which the number *ten* is found to be easily managed. The highest figure denotes perfection for the variety, and five is mediocre, below that is condemnatory. The total of the marks should exceed fifty per cent of the possible number, or the entry must be passed as unworthy of award.

PROCEEDINGS OF 1878.

LINCOLN, Neb., January 17, 1878.

Annual Meeting Nebraska State Horticultural Society, convened at Library Hall, and called to order by President Rob't W. Furnas. Secretary Wheeler being temporarily absent, B. D. Slaughter was requested to act in his place for time being.

On motion of Col. Matthewson, adjourned until 7 P.M.

Society met pursuant to adjournment.

President Furnas delivered the following

ANNUAL ADDRESS.

Gentlemen of the State Horticultural Society:

I assure you that it is with no ordinary degree of pleasure I welcome you to this important meeting, and congratulate the friends and co-laborers of horticulture in Nebraska upon the successful results which have followed and crowned faithful and persistent efforts, especially in pomology. To the few who entered upon the doubtful and uncertain enterprise of fruit growing in Nebraska twenty-four years ago, as well as those who have joined in our labors from time to time since, there is much to be proud of. Through the efforts of this organized society, we have not only taken a place among the prominent, but an advanced position in the front ranks of competitors, not only in the United States, but in the world. Providence has been exceedingly lavish with natural surroundings, and in most sections of the State, enterprise and energy have utilized to an unusual extent these advantages. Having been one of the few to inaugurate fruit growing in the territory, a continuous participant in labors producing results narrated, and an eye witness to each step of progress made, I may be pardoned for an exhibition of seeming egotism on this occasion.

In casting the mind's eye back over the years since we first began, and calling over the names of fruit growing pioneers, it is pleasant to know, and a cause for gratitude to the Great Dispenser of gifts, that many—in fact a majority of them—have been spared to behold the great results so few years have produced. Our fruit exhibit at the late State Fair was so magnificent in all its proportions that even the most devoted and sanguine friends could not be to made believe without seeing. An instance actually occurred verifying this assertion, which is worthy of narration and record. One of the oldest citizens of the territory and state, a firm, devoted friend and co-laborer from the beginning, in matters of fruit growing, forestry and other developing agencies, resident over a half hundred miles from the Fair, hearing the marvelous reports of our exhibit, could not believe it possible. He came and saw. His exclamation was like unto that of the Queen of Sheba to King Solomon on the occasion of her famed visit to that man of renown: "It was a true report that I heard in mine own land! Howbeit, I believed not the words until I came and mine eyes had seen it. Behold, the half was not told me."

The general fruit crop of 1877 has been uniformly good where trees were old enough to bear. We never enjoyed such a magnificent apple crop. The cold spring weather injured peaches to such an extent that there was an imperfect yield. Specimens, however, were fine as could be desired. Prices have been good. Apples ranged from 75 cents to $1.50 per bushel. Peaches from $2 to $4 per bushel. The apple yield in very many instances was wonderful. I have personal knowledge of trees fourteen years old, yielding twenty-eight bushels to the tree, and sold at $1 per bushel. One orchard of 285 trees, at fourteen years old, gave a total crop in one season of 1,400 bushels, and sold at $1 per bushel. This was $100 each year for the fourteen consecutive years, from date of planting, to say nothing of preceding years, say eight years from planting to date of yield named. Trees older, yielded in instances as high as thirty-two bushels to the tree, actual measurement. I myself gathered the past season four bushels of apples from trees eight years old from graft. One farmer I know in my own county—Nemaha—had 100 trees, eighteen years old that averaged twenty bushels to the tree. These trees were planted about 100 to the acre—too close—and show an increase in a single season of $2,000 per acre.

The grape crop was very heavy and brought good prices—from four to fifteen cents per pound. More plums, prunes, apricots, and nectarines were raised the past year than ever before. The cherry crop, for the same reasons affecting peaches, was light, in fact, near a failure.

I am unable to obtain and present reliable data as to the number of trees and acres under cultivation in fruit in the state. Such information would be valuable, both to the society and public generally. But thus far, and under existing circumstances, it seems to be out of our reach. The means of obtaining it could be easily provided by an amendment to the revenue laws, requiring assessors to attend to this with other duties. Such a provision is in existence in our sister state—Kansas. The attention of our legislature has been called to this matter repeatedly, but without success. Selecting United States Senators, "smelling" state institutions, probing character of members, and through the medium of select committees endeavoring to determine the new and vexed questions "of who struck Patterson," or "killed Cock Robin," seem to engross the attention of the latter day Legislature. When these, to them, overshadowing questions shall have been disposed of, agriculture, horticulture, immigration, and other kindred matters may possibly receive passing notice.

At present date, fruit buds indicate an abundant fruit crop for 1878. The fruit ordeal with us, however, is yet to pass—the warming influence of the season generally in February and March, often followed by sudden, short and extreme cold.

I had intended to present as a postion of this my annual report, an elaborate history of fruit growing in Nebraska. At the earnest solicitation of Col. Wilder, president of the American pomological society, for publication as a part of the proceedings of that society at the late meeting held at Baltimore in September last, I prepared and submitted a report on that subject. As that report has already been published in the state agricultural periodical—*Nebraska Farmer*—I will let very brief reference here suffice.

Rev. William Hamilton, now and for many years past missionary for the Omaha Indians, located in the northern part of the state, undoubtedly planted the first fruit trees in the region once known as the "Indian Territory of the Great American Desert." In 1837, he came from Pennsylvania as a missionary to the western Indians, locating at a point now known as Highland, Kansas, some ten or fifteen miles south of the present Kansas-Nebraska line, and about the same distance from the Missouri river. The following year he planted fruit seeds he had brought with him, and afterwards procured cions from his old home, with which he grafted his seedlings. Stephen Story and Rev. A. Ballard planted a few apple trees in Richardson county, this state, in 1854. The same season Christian Bobst planted some in Pawnee county. In 1855, Rev. Wm. S. Horn, now a resident near Lincoln, and Rev. John W. Hall, planted apple trees in Nemaha county. The same year, Hon. James H. Masters, first president of this society, planted in Otoe county. In 1856, Hon J. Sterling Morton planted in Otoe. Thomas Gibson, then in Dodge, now in Washington county, and myself in Nemaha, planted the same season. In 1857, Broad Cole planted in Cass county. In 1858 Dr. E. Lowe planted in Douglas county and Colonel Stevens in Washington. The same year I planted 50,000 apple grafts in Nemaha. In 1859 and 1860, and thereabouts, quite a number of persons planted orchards. J. B. Judd, J. W. Hollinghead, and L. A. Stebbins, Pawnee county; N. H. Rohwer and James S. Stewart, Washington county; Perry Walker, Cass; C. F. Eckhart, Dacotah; James N. Gregg, Joel Draper, and Armstrong, Otoe; Bird Vowell, Alex. McKinney, and Stephen Groesbeck, Nemaha, are personally remembered.

The Nebraska State Horticultural Society was organized at the State Fair held at Nebraska City, September 29, 1868. First officers: J. H. Masters, President; O. P. Mason, Treasurer; R. W. Furnas, Secretary. In addition to these, were: J. S. Morton, C. H. Walker, J. Edwards, J. H. Croxton, B. Aldrich, J. M. Taggart, A. Saunders, J. W. Pearman, L. A. Walker, D. Butler, F. A. Tisdel, O. Harmon, J. H. Gregg, J. B. Weston, P. W. Hitchcock, H. R. Raymond, G. B. Graff, and W. D. Wilson (of Iowa).

To solve the fruit problem in Nebraska has not only cost a deal of time and labor, but actual money, in experimenting and determining what varieties were reliable and best adapted to the soil and climate. In talking over this matter not long since with one who has been an ardent worker and experimenter in the cause from the commencement, in figuring losses and cost of experiments, the conclusion was reached that not a tree in our orchards has cost less than $100 each. Those who plant trees to-day have only to avail themselves of the advantages secured by the early labors and experimenters.

While, as I have before stated on several occasions, I am convinced that more natural surroundings for successful fruit growing are to be found in what we call river counties—those bordering on the Missouri river—there is no good reason to forbear or abandon efforts in any portion of the State. The soil of the bluff land along the Missouri river is that peculiar and remarkable deposit known in geology as "loess," and produces the very best fruit in the world. In addition are the large water surface of the river and greater abundance of timber, all of which produce a climatic influence not found to such an extent in any other portion of the state or west. No one need fear, however, satisfactory results in any portion of Nebraska, where efforts are attended with an equal amount of intelligence and perseverance usually given to any other successful manipulation in agricultural pursuits. None should undertake fruit growing anywhere, or under any circumstances, unless they are in love with the calling—love to propagate as well as see and eat fruit; ready and willing to study and learn. There is no less to be learned of the structure, nature, habits, and general characteristics of a fruit tree than of the anatomy of the human frame. Indeed, in many respects there is great similarity. Therefore, undertake fruit culture, as everything else should be, understandingly and with care and attention.

Fruit growing has become an important factor in the productive interests of the United States, and for many reasons should be an equally important feature in our own local interests. In the old world, where the soil has been manipulated for centuries past, its productive properties have, to a very large and alarming extent, been exhausted. Hence to the new world they now look for the standard and substantial necessaries of life—corn, wheat, and meats. For the past two years, particularly, our fruit products have been taking the same direction. A brief mention of facts need only be here made. One year ago last month ninety thousand barrels of apples grown in the United States were landed in Liverpool inside of thirty days. Two and a half millions dollars worth of American dried fruits was sold in Europe during the last twelve months. New York city consumed 10,000 bushels of strawberries in a single day the past season, and Cincinnati 9,000 bushels in the same time.

To a corresponding extent the facts referred to and existing between the old and new world are to be found between the extreme east and west of our own land—the United States. The soil in the older eastern states has for years past shown unmistakable evidence of exhaustion and decay. The capital and labor of that section have been directed more toward manufacturing than producing life foods. The enterprise, labor, and virgin soil of the far west become producers. This partial digression from the subject proper is made to show the important productive interest, to foster which this society was organized and exists.

The importance of our horticultural, agricultural, and pomological societies is not fully appreciated I sometimes think. They have exerted a powerful influence, both in the old and new worlds, and have for many years been shaping important interests. The working membership is few in number, but there is consolation in knowing that "they who do the drudgery are representatives of a vast host of men and women, both in country and city, who are constant workers and earnest co-operators, whose sympathies are with these societies, whether national, state, county, or town. While the few have been ostensibly doing the work, they have always been able to fall back upon a large and earnest constituency for moral support at least. Ambitious men, in instances, not understanding this feature of their existence, have tried to brush them away. But hosts of friends have always been born of the dust which their attempted destruction created."

In the old world, horticultural societies have associated with them some of the best minds in England, who are efficient workers in promoting their distinctive objects. The American Pomological Society has, for over a quarter of a century past, made itself felt as a power for good in the land, and has among its active, working members men from every state in the Union, representatives of leading and important national interests. It is not egotism to say that our own state society, young as it is, has excited a marked influence for good in the state. It has solved difficult problems, advertised the state, and very materially promoted the work of immigration. Among our members, I am proud to say, are to be found representative minds, efficient professors, students and observers, who are laboring without fee or reward to utilize the very many natural advantages with which an ever bounteous Providence has surrounded us.

A man born on the banks of one of the noblest and most fruitful rivers in America, and whose best days were spent in gardens and orchards—A. J. Downing—talking of fruit and fruit trees, says: "Fine fruit is the flower of commodities. It is the most perfect union of the useful and the beautiful that earth knows. Trees full of soft foliage; blossoms fresh with spring beauty; fruit rich, bloom-dusted, melting and luscious, are the treasures of the orchard and garden, temptingly offered every land-owner in this bright, sunny, and temperate climate. He who owns a rood of proper land in this country, and in the face of all pomonal riches of the day, only raises crabs and choke-pears, deserves to lose the respect of all sensible men. The science of modern horticulture has restored almost everything that can be desired to give paradisaical richness to our fruit gardens and orchards.

"Yet, there are many in utter ignorance of fruits, and who seem to live under some ban of expulsion from all fair and goodly productions of the garden. Happily, their number is every day lessening. America is becoming a young orchard. In one of the newest states in the Union nearly a quarter of a million of fruit trees were planted in a single year. More peaches are exposed annually in New York than are raised in all France. American apples command double prices in European markets. There is little need of entering into praises of this soil and climate generally regarding the culture of fruit. In every part, every man may, literally, sit under his own vine and fig tree."

Mr. Barnard, of the first district, made his report for the year. He stated that there had been planted in Pawnee county, during the year 1877, over fifty miles of osage hedge, all of which was doing well, and many miles of which there was not a loss of ten plants to the mile.

J. W. Meserve, of Gage, read a report from his county.

Prof. Thompson gave a summary of statistical information derived from answers to circulars sent out to people in his district.

J. T. Clarkson reported, in a short and concise manner, from district No. 4.

E. Arnold, from Ponca, reported for the sixth district. A. C. Jenks, of Saunders county, also made a good statement.

M. S. Budlong, from the fifth, gave a short resume of their work.

J. E. North, of Platte, sent in his report, which was read by the secretary.

The financial report of the president for the year was read and approved. It showed:

Receipts	$443.95
Expenditures	452.85
Balance due president	$8.00

Order drawn to balance account.

The following resolutions were adopted:

WHEREAS, The members of the Nebraska State Horticultural Society fully recognize the fact that the preservation and renewal of our forests is a matter of vital importance to the future interests of this nation; and as the subject has been recommended to the attention of congress by the President of the United States in his recent annual message, in furtherance of this great and important subject, it is hereby

Resolved, That we heartily endorse the recommendation of the memorial of the committee of the American Nurserymen's Association, and commend it to the careful consideration of the Congress of the United States, and that we urge the passage of the bill No. 1218 of the house of representatives.

Resolved, That copies of these resolutions be signed by the president and secretary of this society, and forwarded to our senators and representatives in congress.

Quite a discussion was held on these resolutions, in which Messrs. Winslow, of Cass, and Meserve, of Gage, took opposite sides. Professors Thompson and Aughey also gave their views on the subject. Judge Redick, of Omaha, told how he didn't succeed in making an orchard, while Winslow brought up the rear with a telling fire all along the flank.

On vote, the resolutions were adopted.

The society adjourned to meet to-morrow at 2 P. M., in library hall.

AFTERNOON SESSION—SECOND DAY.

Called to order by the president, at 2 P. M., in library hall.

After reading a communication from an old Nebraskian, now a resident of Utah, Mr. J. E. Johnson, the secretary and treasurer's reports were read and referred to the finance committee.

The treasurer's report showed:

Receipts	$493.30
Orders paid	486.52
Balance in hands of treasurer	$ 6.78

The secretary's report showed:

Orders drawn	$503.12
Received for memberships	33.00

The election of officers resulted:

Robert W. Furnas, *President.*
Charles Matthewson, *First Vice President.*
E. N. Grennell, *Second Vice President.*
D. H. Wheeler, *Secretary.*
John Evans, *Treasurer.*

L. Crounse, S. Barnard, E. F. Stephens,	*Directors.*
C. Hartman, M. Dunham, C. Matthewson,	*Finance Committee.*
J. H. Masters, S. Hobson, S. Barnard,	*Committee on Synonyms.*

On motion, Col. Matthewson, the president, was authorized to appoint one individual in each organized county of the state to report on horticulture and kindred interests to the chairmen of the several district committees.

On motion, D. H. Wheeler, Robert W. Furnas, S. Barnard and Col. Matthewson were appointed a committee on premium list.

Mr. Craig asked some changes in floral premiums, which were granted.

The following valuable paper, by Dr. JOHN A. WARDER, Ohio, was read, and ordered published with proceedings.

POPLARS, ABELES OR ASEPNS, AND COTTONWOODS.

In the *Gardener's Monthly* for November, 1877, are some strictures upon the name *Populus angulata*, used by my friend, Dr. Furnas, of Danville, Indiana, as applied to the Carolina Poplar. His stock was received from Mr. Parry, New Jersey, and through him it came under my notice, in some cuttings received last spring, which have made a growth of three to four feet. For the suggestion of the name *angulata*, as applied to these plants, I must assume the responsibility, and it may be an error. The conclusion may have been reached too hastily. It was given on the authority of Michaux, Sylva Americana.

Having been induced to look up the authorities within reach, the following analysis of the genus, the result of this investigation, is presented for the benefit of your members:

COTTONWOODS.

1st. *Populus angulata*—Michaux, Carolina Poplar. Michaux says this species, which he met under the name of Carolinian Poplar, was found southward, in Virginia, and on the Mississippi and Missouri rivers growing with the cottonwood *Canadensis*. He describes it as tall-growing and upright, which is the character of the Carolina. The buds are short, dark green, and destitute of the resin found on those of the Cottonwood and other poplars. This is believed to be the tree so prevalent in parts of Belgium, where it is planted along the canals, for which purpose it is especially adapted by its upright habit.

2d. *Populus Canadensis*, of Michaux. The cottonwood is considered by Dr. Gray[1] to be the *monilifera* of Aiton, and the *laevigata* of Willdenow. Wood's No. 5 *monilifera* of Aiton, seems to be different with habitat "on the Hudson, near Troy, N. Y., apparently native." "Fide Beck."[1]

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[1] Manual of Botany, Asa Gray, 2d Edition, 1856, His. No. 4, page 419.

Michaux found this species as far northward as forty-three degrees, It is abundant in the Black Swamp, in north-western Ohio, and fine trees may be seen on the banks of the river below Detroit, Mich. Michaux describes the tree as larger than the *angulata*, and the bark as thicker and more deeply furrowed, having a wider head and with the boughs more thickly branched. This character of the outer bark has attracted the attention of the fishermen on the lakes, who utilize it as a substitute for the more costly bark *Quercus suber*, or cork. Sections of this substance, often three inches thick, are turned into oval form and perforated, so as to be used as floats to their gill-nets.

Michaux reports this species rare on the Atlantic slope, but very common on the Mississippi above the Arkansas. At the mouth of the last-named river it grows abundantly around the town of Napoleon. It is the chief source of the steamboat fuel on our southern streams.

3d. The Virginian or Swiss Poplar, *P. monilifera* of Michaux, supposed by Gray to be P. monilifera of Aiton, does not appear to have been found in this country by the Michaux, father or son, but they say it is extensively cultivated in Europe, especially in Switzerland. In France the males only are found. The young shoots are angular. Comparing it with Cottonwood, Mr. Fancourt, director of forests and water-courses, says the leaves are smaller and less distinctly heart-shaped; the young shoots and twigs are smaller and less angular, becoming cylindrical in the third year, and the limbs are less divergent than the cottonwood. It also grows faster, and succeeds in drier soils, hence its popularity in France.[2] The wood is said to be softer than cottonwood, or *P. Canadensis*, of Michaux. Dr. Torrey found it in western New York, on Lake Oneida and Genesee river.[3]

4th. The Cotton Tree, *Populus argenta*, Michaux, and according to Gray *P. heterophylla*, L., is found in the middle, western, and southern states; and Michaux, especially, refers to a large swamp in southern Illinois, and to Fort Massac, on the Ohio river as habitats.

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[1] Class Book, Alphonso Wood, 41st Edition, 1855, page 507.

[2] N. Amer. Sylva, vol. ii., page 120.

[3] New York Natural History, Botany, vol. ii., page 215.

The tree is large, with thick bark, the shoots are round, the young leaves very downy, becoming large, and having the lobes at the base overlapping each other.

The wood is described as inferior, becoming yellowish at the heart.

All of these would probably receive the name of cottonwood among our Western wood-choppers; and, indeed, they bear very near resemblance, and have close analogies. The fine botanical descriptions have been purposely omitted in this resumé.

POPLARS.

Populus balsamifera—Tacamahaca, or Balsam Poplar, is a very distinct species. This is particularly northern, extending to Stonelake, latitude 63.[1] Leaves on round petioles, dark green above, rusty brown beneath; tree of medium to large size, with open, straggling branches. Though unseemly, it is often found in cultivation.

Populus candicans, of Aiton, Balm of Gilead, is a variety called also Heart-leaved Balsam Poplar. This form is chiefly seen in cultivation, though it has little to recommend it.

Populus augustifolia, of James, is described by S. B. Watson, of Clarence King's survey of the fortieth parallel, as a common tree in the Rocky Mountains. It is now grouped with *candicans* and *balsamifera*, of which it is a very distinct western form, having also quite a diversity in its foliage, some leaves being ovate, while in other trees they are nearly linear, and with a drooping spray. The resemblance to willows is very striking, as seen on the Platte river, Colorado, near Denver.

8th. *Populus trichocarpa*, Torrey, is western, found in Truckee Valley.

9th. *Populus nigra*, L. European, was not recognized by the Michaux in this country, but trees found near Albany, N. Y., on the Hudson, and in New York city, were described by them as *P. Hudsonica*, and by Pursh as the *betulifolia.* There is little doubt about its having been introduced from Europe, where it grows to a large size, and with *P. alba* is much used along the Danube in reclaiming low overflowed lands, whose thickets arrest the drift of floods and furnish abundant material for the fascines used in the wing dams and levees, erected for improving navigation.

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[1] Dr. Torrey, Natural History, N. Y. Botany, vol. ii., page 316.

10th. The Lombardy poplar, *Populus dilatata*, of Aiton, is no longer looked upon as a species, but merely a variety or sport from the *nigra*. This is extensively grown as an alley tree along the highways of southern Europe, where it is a great favorite, despite its extremely formal habit. It was early introduced and extensively planted in this country also, particularly in the streets of towns and cities. In the Eastern states very large trees may yet be seen in good condition. In the western states, especially in northern Illinois and Wisconsin, it has been largely planted to fence-rows as wind-breaks, and the effect in a prairie country is very pleasant; but in our western soils the tree does not prove in be long-lived. The plants found in this country appear to be only males. How is it in Europe ?[1]

Watson, in his "Annals of Philadelphia," says this tree was introduced into that city in 1874 by William Hamilton, Esq., of "The Woodlands" (near the Centennial Exhibition), and all the Lombardy poplars in the United States may be considered branches, elongations or offsets of the tree from which Mr. Hamilton obtained his specimen.[2]

ASPENS.

Aspens, or Abeles, form a distinct group among the poplars. They are usually smaller trees, especially the American species.

11th. *Populus tremuloides*, Michaux. Quaking asp is here but a small tree of the second or third class, seldom more than twenty to forty feet high, particularly toward the north, where it becomes a mere shrub. A form of this species in the parks of the Rocky Mountains springs up spontaneously in the greatest abundance wherever the woodlands have been burned over. The older trees had handsome shafts fifty to sixty feet high, and are used in construction. This is almost unique as a deciduous tree among the conifers of that region.

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[1] This question is already answered by my friend and jury colleague at Vienna, Gav Giovanni Carlo Siemoni, who says this poplar is but a form of the *P. nigra*, and that all the plants are males. He adds that it has long been extensively planted in Lombardy particularly along the river Po. In evidence of its antiquity, he quotes Ovid's reference to it.—*Manuale d' Arte Forestale*, Firenze, 1872, page 137.

[2] Darlington's Agr. Botany, 2d Edition, page 332.

Generally speaking, this species has little value, but there are some peculiar forms which are cultivated and placed for effect in gardens and parks.

12th. *Populus grandidentata*, Michaux, Michigan poplar of nurserymen, is a much finer tree, also northern in habitat. On account of its rapid growth, this had received considerable attention by Western planters, and though only a poplar, merit is claimed for it as a fencing material;[1] the poles cut in early summer and peeled have been found to last as well as rails nailed to posts for fencing.

13th. *Populus canescens*, or the *Populus alba*, Linnæus, the common white or gray poplar, with its many forms or varieties of Abeles, Athenian, maple-leaved and silver poplar.

Though widely diffused and planted everywhere, and multiplied wonderfully by numerous suckers in their new home, these are believed to be of European origin. If correctly understood, my good friend, Prof. Karl Koch, of Berlin, who has made a life study of trees, considers this species to be American, or common to both hemispheres. His valuable work[2] is unfortunately not at hand.

Populus tremula, Linn., is a small tree in Europe which may some day be united with our *P. tremuloides.* It is chiefly valued as a first crop on devastated tracts to prepare the soil for those of greater utility, says Siemone.[3]

In Southern Europe the white poplar becomes a noble tree, and the timber is much used in the construction of dwellings. It may be found valuable by our Western planters. Michaux claims two distinct trees, the white and the gray, attributing superiority to the latter.

President Furnas showed twenty plates: White winter Pearmain, two varieties Romanite, Swarr, Perry Russet, Grimes' Golden, Huntsman, Favorite; Rawles' Genet, Baldwin, Ben Davis, Winesap, Sops of Wine, Jonathan, Missouri Keeper, Ribston Pippin, Detroit Red, two varieties Crab. Judge Crounse placed on the table, from the orchard of Hon. E. N. Grennell, Fort Calhoun, specimens of Northern Spy, White Bellflower, Baldwin, Talman Sweet, Imperial Grey, Jonathan, Swarr, two varieties Jeneton.

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[1] Bryant's Forest Trees, page 124.

[2] Kock's *Dendrologie.*

[3] *Manuale d'Arte Forestale.*

The premium list was revised, and a number of premiums increased; $50 is offered for the best collection of fruit; $25 for the second best.

Prof. S. R. Thompson offered the following resolution, which was unanimously adopted:

Resolved, That this society heartily approves of the effort now making by Prof. Bailey, under the auspices of the State University, to procure and collect more complete weather statistics of the state, and requests all friends of horticultural improvement in the state to aid in making these weather reports as complete as possible.

The committee on finance reported the accounts of the treasurer to be correct.

J. T. Allan offered a resolution, which was unanimously adopted, voting thanks to James Vick, of Rochester, N. Y., for his enterprise and liberality in offering $20 as a premium on floral display at our next exhibition.

Attention was called to the duties of assessors, under the act of the last legislature, whereby statistics could be obtained showing the progress of the state.

The president introduced Prof. Bailey, who had been invited to deliver an address on "Meteorology and its Relations to Horticulture." In advance of the publication of this and succeeding essays, it is impossible to do justice to them, as they are all filled with scientific and practical information. The Professor illustrated by maps the isothermal lines, and from observations fixed the mean temperature at 72 degrees, which is extremely favorable to grape culture. The average rainfall at Omaha for a number of years previous to 1870 was 35.2 inches. Orchards, he said, should be planted on high grounds; low bottom lands are more liable to frost and drouth.

Prof. Wilber being absent, his address on "Geology, in its Relations to Horticulture," was delivered by Prof. Bailey. The subject of geology might be considered by some as dry, but this was extremely interesting, and was listened to with marked attention.

J. T. Allan delivered an address on forestry, dwelling at some length on plant growth, and the effects of forest and moisture. His remarks were forcible and practical. One remark he made was appreciated by the audience. He said: "While we are calling for the dollar of our daddies, our children will call for the forests of our daddies, if we do not plant forests, and do it at once."

An address, which was listened to with great interest, was that of Prof. Aughey, on entomology. Prof. Culbertson presented an essay on ornithology.

D. H. Wheeler introduced the following, which was unanimously adopted:

Resolved, That Professors Samuel Aughey, G. E. Bailey, H. Culbertson, C. D. Wilbur, S. R. Thompson and Mr. Jas. T. Allan be elected honorary life members of this society, as a recognition of their valuable services for years in furnishing essays on various subjects, statistics, and other information to this society.

Forest-growing has perhaps been as prominent a subject as any discussed at this meeting. The next report of the society will show that several counties have planted millions of trees.

Mr. C. H. Walker offered the following resolution in reference to the timber interest, which was unanimously adopted:

Resolved, That our senators and representatives in congress be requested to use their utmost endeavors to secure an amendment to the timber culture act to provide for the withdrawal of one quarter of every section of the public lands now subject to entries under said act, for the purpose of timber culture.

Mr. Walker also offered the following, which was unanimously adopted:

Resolved, That our senators and representatives in congress be requested to urge an amendment to the homestead act, requiring the cultivation of at least four acres of timber on homesteads located on prairie lands, before a final receipt shall be given.

The following letter was read from Dr. C. C. Hamilton, an honorary member of the Nebraska State Horticultural Society:

CORNWALLIS, NOVA SCOTIA.
January 1st, 1878.

R. W. Furnas, President Nebraska State Horticultural Society:

A notice of the annual meeting of your society reached me some time since, and as distance prevents me from being with you, I beg to send you this short epistle to thank you for putting my name on your roll of contributing members.

Almost thousands of miles separate us, as well as a *National boundary line*, yet I trust, on the great subject of Fruit Culture and Agriculture, we are one on the principle and action. You, as a Nation, are proud of your country, its laws, its many good and great men, as well as your institutions of learning and science, and its rapid progress. And we *Britishers, away down East beyond the State of Maine*, love our Queen, our country and laws, and the proud position she has and still occupies among the Nations of the Earth, yet there is sufficient for us all to do in promoting that which is for our individual and national prosperity without quibbling about national matters.

It has been my good fortune to mingle with many of your leading pomologists and farmers at your annual gatherings in many States of the Union, and I never did so without being pleased with the attention I received and kindness manifested on such occasions, and nothing would please me more than to be with you at your intended meetings, but, as I said, distance only prevents me.

I scarcely know what to say to you that would be interesting to your Society. I am not a scientific pomologist, having spent over forty years in practicing the profession of medicine, and only attending to fruit culture and farming when not otherwise engaged. I therefore do not claim any distinctions or merit for what I know on these points, as it is commonplace and what every lover of good and beautiful in nature should know.

The province of Nova Scotia, although far to the north and having the cold wind and floating ice to the north and east, especially in April and May, coming from the polar regions, yet in the Midland counties all the hardy fruits are cultivated successfully. The apple is our main crop, and is cultivated to considerable extent, and grows to good perfection. Our exhibition at the Centennial, at Philadelphia, last year, excited much surprise and elicited praise from many of the pomologists of the United States, and we received a diploma, certificate of merit, and a large bronze medal from the "U. S. Centennial Commission." We also grow all the stone fruits to perfection, pears, quinces, and some of the earlier kinds of the peach.

Grapes do not succeed well unless we adopt a principle I know is condemned in the United States as affecting the flowers. The "Climax" and some of the earlier varieties will ripen well in favorable seasons. I have grown and ripened the "Black Hamburg" in the open air, but with a good southern exposure, and with some trimming and guiding, but only attempt it as an experiment.

In the year 1862 a Fruit Growers' Association was founded, which has done good service in extending the cultivation of fruit of various kinds, and making our people better acquainted with fruit culture. We generally have an annual exhibition and award quite a sum of money for premiums. Our last exhibition (Oct., 1877) was combined with a Provincial Agricultural Exhibition, and was very successful. I may say that I have had the honor of being the President of the Association almost since its formation.

We are now adopting the principle of a Fruit Convention and shall in the future have our annual discussions, etc.

As regards our Province as a whole, it is now pretty well known that in addition to her agricultural capabilities she is rich in mines and minerals, and has the best *Fishery* in the known world. We are in advance of any county or state in our commercial marine. We own 500,000 tons of shipping—equal to 1¼ tons for every inhabitant, and the Dominion of Canada is the fourth in the world in the ownership of ships, etc.

Up to this date we have had but little snow, scarcely enough for sleighing, and the ground but slightly frozen. For the past month the thermometer has only been but a part of the time much below the freezing point.

You will please excuse this hastily written note and accept my best wishes for the prosperity of your society. Nothing would please me more than to have some of your leading men visit Nova Scotia in the month of September or early part of October to see our fruit trees laden with well-formed highly-bloomed apples.

I remain, your obedient servant,

C. C. HAMILTON.

The following letter from Arthur Bryant, honorary member, was read:

PRINCETON, ILL., January 11, 1878.

R. W. Furnas, Esq.:

DEAR SIR—Although I have never been within the limits of your state, I have long felt an interest in your horticultural pursuits, and more particularly in your forest planting enterprises. I am glad to hear that many of your settlers are awake to the importance of clothing a portion of the naked prairies with wood. In Illinois, notwithstanding the efforts of our horticultural societies for many years past, but little attention is given to the subject. Most people plant fruit trees; many for shade and ornament; some plant screens or shelter belts; but very few instances have come to my knowledge of planting with a view to the production of timber. A more speedy return for labor is found in the production of grass and grain.

It has been asserted, with great appearance of probability, that if one-fifth of a prairie farm were planted with wood the profit from the rest would be as great as at present from the whole. Shelter is certainly an advantage to crops. I have repeatedly, in cold backward seasons, noted the difference between corn growing in sheltered situations and that on the open prairie. The extremes of heat and cold are greatest in countries destitute of woodland. It is well known that extreme cold, accompanied by wind, is sooner and more certainly fatal to both animal and vegetable life than the same degree of cold with a still atmosphere.

I have lived on the prairies of Illinois almost fifty years. I have observed what must be apparent to other old settlers, that the average force of the prevailing winds has greatly diminished in that time; or, as it is commonly expressed, the country is less windy than formerly. The only apparent cause of this is the hindrance offered to the free passage of the winds by the buildings, fences, orchards, and scattered trees in the open country. If a cause, in appearance so slight and inadequate, can produce an effect so obvious, is it not reasonable to suppose that if one-fifth, or even less, of the area of each prairie farm were planted with groves of timber the result would be an essential modification of the climate? The convenience and material advantages of having timber at hand when needed for farm uses are too apparent to need mention.

My attention has lately been called to an article written by J. M. Fell, of Bloomington, Ill., published in the Sioux City *Daily Journal*, and copied in the Chicago *Tribune*. Mr. Fell relates his experience in tree planting in North-western Iowa, and recommends the white willow in preference to any other tree for that country. Mr. Fell's experience is doubtless entitled to much consideration; but when he asserts that the white willow is durable when used for stakes, posts, and railroad ties, he contradicts the testimony of all writers upon the subject which I have ever read, as well as my own experience and observation; though these are not extensive. Speedy decay when exposed to the alternations of dryness and moisture, or when in contact with the earth, is a characteristic of the willow family, and the white willow is not an exception; if kept dry or constantly under water it will last a long time. Mr. Fell speaks slightingly of the cottonwood in comparison. I am far from recommending it as durable, yet I will relate two instances of my own experience with it. In the spring of 1845, wishing for some bar rails that were light and easily handled, I cut and split a cottonwood tree for that purpose. These rails passed out of use by being broken or otherwise destroyed, not by decay; but some of them were in existence thirty years afterward. When I settled here I covered the roof of my log cabin with shingles split two feet long, from a yellow cottonwood. When the cabin was pulled down, fifteen years after, these shingles were not decayed.

With my best wishes, yours truly,

ARTHUR BRYANT.

The following letter from one of Nebraska's pioneers was read:

INDEPENDENCE, KANSAS, January 8th, 1878.

Col. R. W. Furnas, Nebraska:

They bring me out to-day your printed notice and programme of the Winter Meeting of your Horticultural Society at Lincoln.

I am taking some comfort in looking forward to some time hence, when it will be my pleasure to come up and be with you—not this year.

It will be far better when the time comes, that the average Nebraskian takes greater pride in the character of the state for the growth of fruit, that you men have built, more particularly that portion of the state north of the Platte.

I mark back with pleasure, to the occasions that brought me down among you in years gone by.

Here we have a great deal to invite, as a fruit region, to be developed for better or for worse, and I could name several of your south Nebraska fruit men that I would wish were here to school us.

To right minded men these conventions are profitable, agreeable, and useful, and I shall expect to hear that on the coming occasion, you will find it to be so, and make converts for the future.

There is an unmistakable reservedness between Kansas and Nebraska on the matter of fruit. After all, it is most certainly possible for Missouri to get up just as good as either in the contests of rivalry, but Missouri herself has not got the get up. Sometime or another the spirit that gets up the St. Louis Exposition will get into the fruit men and make some future exhibition a lively one. Of course, you will be there when that time comes, and between Nebraska, Kansas, and Missouri there might be the greatest fruit display the world has ever seen, and the time is coming. Nebraska is only repeating the penny wise and pound foolish game in withholding the state appropriations from your societies.

To say that good men's judgments were warped in this matter, will be better understood when the state acts more liberally and votes appropriations sufficient to print and get up your annual reports in better style than heretofore. In this respect there can be no long continued delay, and everybody will be even the better pleased when the good change comes.

Kansas withheld an appropriation for a year's transactions of the State Horticultural Society, and hastened last year to mend the mistake, making appropriations for that year and the two years following, and I am pretty confident that the State Horticultural Society will, in the early future years hence, double at least the copies of their annual transactions, and the state will pay for the printing, and binding will be done in cloth at least.

State pride could induce the people to withhold their money from many other expenses rather than this.

Respectfully, L. A. WALKER.

As Superintendent of Fruits at the last exhibition, I beg leave to offer the excellent report of the distinguished pomologists who kindly complimented this society by acting as judges:

THE REPORT MADE BY THE COMMITTEE ON FRUITS.

Your committee have seriously felt the burden cast upon them in examining the displays, in revising the labels, and finally in adjudging the comparative merits in view of making awards; but we have also had infinite pleasure in the pursuit of our investigations. The fruits produced by your fertile soil seem in some cases to have taken a new lease of life, and to have overcome the maladies and troubles with which they have become afflicted in some of their older habits. All of your fruits are remarkably fine, of greater size and beauty than the same varieties in the older fruit sections. In this respect we should feel impelled to make further remark were it not that these facts have been previously observed, and that they have indeed been made notorious by their prior triumphant exhibition in contrast with the fruits of the whole country, when shown in former years at several of the great exhibitions, especially those of the American Pomological Society, at Richmond, Va., at Chicago, Ills., at the great Centennial meeting at Boston, Mass., and manifestly so at the famous Centennial exhibition at Philadelphia. In nearly all these your fruits were triumphant.

As Superintendent of the Fruit Department, I requested the committee to make some suggestions in regard to our show of fruits, with the following result:

There are some suggestions we feel justified in making for your future guidance in the conducting of your exhibitions. To these we ask your respectful attention, and hope that for the sake of all who may be concerned they will receive the care and consideration to which we believe them entitled—both for the exhibitors and for the relief of the superintendent, as well as for the convenience of whomsoever you may at any future meeting engage in the arduous, delicate, and *thankless* office of judges. A little more clearness and definiteness in your *rules* will save your exhibitors from the mortifications to which they are now exposed in learning, when too late, that their fruits are disqualified.

Your superintendent should have at least one assistant for each grand division, whose duties shall be to direct the arrangement of the several articles, with the especial view of collecting all entries for the various premiums as closely as possible together. They should be prepared to find the several entries promptly for the judges, and in the preparation days they should assist the superintendent and at all times at or assisting in policeing the hall.

The superintendent should be provided with a suitable book in which to make all entries as he may be called upon—numbering the articles, entries, and cards *seriatim*. But he should also be furnished with books (portfolios) into which these entries should be transcribed, in a different order, classifying them and arranging all competitors for any given prize on separate pages, under their appropriate heads, as in your premium list. Nothing else should be placed upon the page, which should be the left one, leaving that to the right entirely blank and ready to receive the notes and decisions of the committee.

The committees should not be asked to perform so much service as at present. This could readily be avoided by dividing the labor among two or more sets of judges, who might be thus selected for their peculiar fitness for special departments of pomology, and at the same time the division of labor would make the duties of all much less onerous.

It is not our intention to complain, but, in the present instance, where most of us are from beyond your borders, it has happened that we have been entirely prevented from witnessing any other portion of your great exhibition than that which fell under our immediate inspection as judges, and this required of us the utmost diligence to dispose of within the allotted time.

The great and grand display of last year calls for the above just complaint, and at the same time there is hidden a compliment as to the extent of our fruit display. I would suggest a vote of thanks to Dr. Warder, Dr. Furnas, and the gentlemen Coffiman, who kindly accepted our invitation to serve in the capacity of judges. While they speak of the labors involved, they at the same time express the satisfaction they experienced in the examination of our prime apples, the grand display of pears, the rich show of peaches —and these, too, coming from a wide expanse of country on the great desert—grapes, crabs, and in fact all varieties of fruit shown met with their genuine approbation.

AWARDS.

As the Society has not had the means to publish our reports, I take the liberty to mention the awards of the excellent committee and the varieties, which should be of interest to future planters. This should be a special point in future awards.

For the best and largest collection of fruits, etc., we have adjudged the premium to that from Nemaha county, $50. The competition was very close between this and the fruits from Otoe and Washington counties, but we feel impelled to render as above, on account of the greater number of kinds. To the latter, however, we desire to accord the meed of high recommendation for excellence, and especially to the Otoe collection, for the very remarkably correct naming of their fruits, which is worthy of honorable mention. Other county collections did not come up to the regulation standard.

For a collection of autumn apples, not less than five varieties, the award is made to Hiram Craig, of Washington county, including Autumn Spy, Fameuse, Ribston Pippin, Orange Sweet.

For collection of winter apples, not less than ten varieties, the first premium to the Richardson county agricultural society, including Northern Spy, Jonathan, Winesap, Rawle's Janet, Smith's Cider, Y. Bellflower, Ben. Davis, Rhode Island Greening, Roxbury Russet, Swaar.

Second premium to Hiram Craig, Washington county, including Northern Spy, Ben Davis, Esopus Spitzenburg, Baldwin, Roxbury Russet, Winesap, Milam, Rhode Island Greening, Perry Russet.

For collection of five varieties to Richardson county agricultural society, including Winesap, Rawle's, Jonathan, Ben Davis, Northern Spy.

Second premium, J. H. Bailey, Lincoln, including Jonathan, Ben Davis, Domine, Smokehouse, English Russet.

For collection including summer, fall, and winter, to H. C. Vose, Otoe county, including Trenton Early, Bailey's Sweet, Maiden's

Blush, Northern Spy, Rhode Island Greening, Rambo, Grimes' Golden, Rawle's, Yellow Bellflower, Ben Davis.

The second to Nemaha county society, including Maiden's Blush, Autumn Swaar, Rambo, Fallawater, Kaighn's Spitzenberg, Ortley, Ben Davis, Tallman's Sweet, Jonathan, Northern Spy.

For collection of Siberian crabs, to Hiram Craig, Washington county, embracing twelve varieties.

PEARS.

For fall pears, to Burt county agricultural society, including Flemish Beauty, Louise Bonne, Buffom, Duchess d'Angouleme.

For collection fall and winter pears, quality to rule, Nemaha county agricultural society, including Duchess d'Angouleme, Bartlett, Vicar of Winkfield, Seckel, Flemish Beauty.

Second premium to H. T. Vose, Otoe county, embracing Duchess, Seckel, Belle Lucrative, Beurre Diel, Sheldon.

PEACHES.

The grand collection of seedling peaches, some forty varieties, exhibited by Gov. Furnas, should encourage every farmer to plant peach seed.

For best collection, to Nemaha county society, embracing a large number of fine seedlings.

For seedling peach, to lot 102, by Mrs. T. L. Shaw, Omaha, for a beautiful white cling with red cheek and red stone, rich and juicy, very good.

Second premium to 225, W. B. Bull, Pawnee, a large, handsomely formed, deep yellow cling, with common cheek, very rich and fine.

GRAPES.

For best collection, not less than seven varieties, to H. Craig, Washington county, embracing twelve varieties.

By the same exhibitor, for Delaware, Concord, Diana, Martha, Hartford, and Clinton.

For best three varieties, profit to rule, to the same exhibitor, Concord, Worden, Martha.

For best three varieties, table quality to rule, to the same exhibitor, Worden, Delaware, Cottage.

Respectfully submitted,

JOHN A. WARDER,

Chairman.

To J. T. Allan, Superintendent of Fruits.

Lincoln, Neb., September 27, 1878.

I take pleasure and pride in saying the fruit exhibition of last meeting is significant of the good time coming. This fruit presents realities of a grand future close upon us, from which we may take mutual encouragement to plant great orchards.

J. T. ALLAN.

PROCEEDINGS OF 1879.

LINCOLN, January 22d, 1879.

Society met in compliance with time fixed by law. Present: Robt. W. Furnas, President; Chas. Mathewson, 1st Vice President; E. N. Grennell, 2d Vice President; Daniel H. Wheeler, Secretary. President Furnas delivered the following

ANNUAL ADDRESS.

It is a pleasing duty to greet those who worship at the shrines of Pomona, Flora, and Sylvanus, and who are engaged in the praiseworthy undertaking of clothing undressed prairies with trees, forest, and fruit, as well as adorning with blooming rose, vine, and shrub. I extend you earnest and cordial welcome to this meeting —to the enterprising capital of a progressive and indomitable young state.

These meetings are the real nurseries for all who labor in the field, and in the direction indicated. Here we bring, for the common good, seeds, scions, and specimens as it were—observations, experiences, and results—casting them broadcast upon the waters and to the winds, that their fruits may be yielded and gathered afterward. At no other time, at no other place, under no other circumstances, can so much of good be accomplished by well directed effort. I trust we appreciate these truisms, and that corresponding works and actions will enable us to realize to fullest extent, inuring benefits.

This organization has much to boast of, much to encourage, much yet to accomplish. Our successes are matters of both pride and encouragement. The wide field open before us stimulates and prompts to further duty.

Results especially of the last year strengthen the hearts and hands of laborers. Many thousands of acres have been added to our forests and orchards. Portions of our state in which it was not before believed tree planting, especially fruit trees, could be successfully grown, have given most satisfactory evidence to the contrary. At our last State Fruit Exhibit, in September, 1878, the display was far beyond anything before shown, both as to quantity and quality. Many prominent and veteran fruit growers from the old states were present—came purposely to see our fruits, and acknowledged themselves more than gratified—were as enthusiastic as ourselves. Much of the exhibit was re packed and taken by our visitors to other state exhibits, where they attracted universal admiration. That Nebraska has no superior as to quality of her fruits, adaptability of soil and climate, is now universally conceded—is of national renown.

The latest tabulated official statistics for the state were for the year 1877 condensed into totals as follows: Cultivated timber, or forest trees, there were in growing order 30,346,571 trees; apple trees, 779,789; pear trees, 20,289; peach trees, 448,823; plum trees, 395,754; cherry trees, 113,478; grape vines, 83,721; hedge fence, 5,212 miles. The apple yield for that year was shown to be 90,570 bushels; pear, 830 bushels; peaches, 17,876 bushels; plums, 768 bushels; cherries, 681 bushels; grapes, 252,250 pounds. The fruit yield for 1878, except apples, was very much larger than that for 1877. Generally, apples were not quite so good. Peaches were at least one hundred per cent better. The U. S. Agricultural Report for 1878 showed Nebraska in advance of any other state in the Union as to her per cent peach crop. We stood 129; one hundred being the maximum standard. Our neighbor, and twin-sister, Kansas, stood next to us. From best information at my command, I feel safe in saying that all tree planting in Nebraska for the year 1878 was not less than 50 per cent greater than in any previous year.

I have not known, in any portion of the state, tree planting, either forest or fruit, failing, when intelligent well directed efforts have been made. I am often asked: "Do you really think fruit trees will grow in this, that, or other sections of the state. I have always replied, I believed they would. But by all means, first plant and make the effort. One such instance I will mention. A few years ago a gentleman in Fillmore county made a similar inquiry of me, and received a similar reply. Last year the same gentleman propounded quite a different inquiry. "What shall I do with the superabundance of young fruit on my trees. They are now bending with weight, and fruit trees not over half grown!"

As to fruit growing in Nebraska—to make a long story short, and answer many inquiries in one, in this public manner—I have no hesitancy in asserting a belief that fruit trees will grow successfully in any part of the state. In saying this, I reserve some provisos and conditions. Some varieties that do well in south-east Nebraska may not do as well in north-west Nebraska. The soil and other surroundings may be somewhat different, and require different manipulation, preparation, and care. Care, intelligence in selecting varieties, in preparing soil, cultivating, and protection, will give satisfactory results anywhere, in my opinion. At least, those wishing fruit, will never have it, or know whether they can raise it or not, until they have tried—made an effort—planted trees.

These are among the encouraging features of horticulture in Nebraska. There are no adventures or enterprises, however, without the reverse—the dark side. One among the most serious obstacles the Nebraska State Horticultural Society is compelled to meet and contend with is the fact that the state lends no helping hand. I am not of those who believe that mere legislative enactments will plant trees, make men more honest, sober, or moral; but can be made instrumentalities, or aids, especially in diffusing light and information. Nebraska professes and can hold out more inducements agriculturally and horticulturally than any other state. Her national exhibits, made by individual efforts, prove this, and warrant the assertion. Yet not one cent is the state expending, or a single effort is it making to publish these facts to the world. But for the commendable efforts made by railroad corporations, who own, and have for sale, large tracts of our fertile acres, together with those of a few individuals, we would still be regarded as a trackless desert. Officers and members of state and county agricultural and horticultural societies, and institutes are willing, and do labor, without compensation, from year to year, gathering facts and obtaining results. Scientific men are equally ready, and do go hand in hand with experience, and under like pay, preparing and delivering valuable essays and papers. All these labors and efforts are worthless outside the very few, comparatively, who hear them. There are now, in the desks of our secretary valuable scientific papers by Professors Aughey, Thompson, Bailey, Wilbur, and Culbertson, and such experienced men, and old residents as Morton, Stocking, Paddock, Allan and others, as would make a half dozen volumes of hundreds of pages each; the proceedings and discussions of agricultural institutes held in various sections of the state, participated in by scientific and experienced men and women, of equal volume and importance. All these, if utilized, printed, and circulated, could not be excelled as advertising mediums, and would add thousands to our population, as well as millions to our values. For some unaccountable reason, legislatures heretofore have overlooked this important item or duty to the state. Nebraska is now the only state in the Union failing to publish in book form and circulate her agricultural, horticultural, and agricultural institute proceedings. Favorable indications from the present legislature warrant the hope and belief that such neglect will no longer be a matter of complaint or reproach to a people and region, for whom Providence has been over bounteous in many respects. In addition, both ex-Gov. Garber and Gov. Nance have made prominent and favorable mention of these matters, and recommend legislative action.

There are certain duties the state owes its people, or rather itself—certain governmental machinery indispensable to life and being, which cannot be evaded. Those to which reference is made are among them. While rigid economy and accountability are expected and demanded, parsimony is neither justice nor wisdom.

Trusting that your deliberations and labors may prove as pleasant and beneficial as heretofore, I wait your further pleasure.

The Secretary made the following

ANNUAL REPORT.

Your Secretary has very little to report of interest to this Society. He can report that the papers and proceedings of the last annual meeting of this Society are still in my hands in manuscript. It is to be hoped that our wise Solons, now in legislative halls assembled, will have the wisdom to devise adequate means whereby the valuable experience of our people may be published and furnished our people for their information. Until some means are provided the valuable papers now in our possession must remain in our pigeon-holes.

The receipts for memberships at our last meeting were $28, which was paid to our Treasurer.

R. W. Furnas, J. T. Allan, L. Crounse, and C. P. Mathewson were appointed a committee to prepare and submit to the legislature a statement showing the needs of this society relative to publishing its reports for the benefit of the public, and ask an appropriation for that purpose.

Adjourned to meet at 4 o'clock.

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4 P.M., January 22d.

Called to order with officers as before. Following letter read from Hon. J. Sterling Morton:

WASHINGTON, D. C.
January 12, 1879.

MY DEAR GOVERNOR:

It will be impossible for me to meet you at Lincoln on the 23d and read the paper before the State Horticultural Society on "Trees and Homes," which I promised you to endeavor to offer. The work is not finished, possibly it never will be finished, but I hope to complete and have it ready for the summer meeting of 1879. It will be better for that time anyway, and I would rather utter it when the leaves and blossoms are dancing on the trees and with their rhythmic whisperings furnishing free music to verify all I can say about the solace of trees and the sanctity of homes. You know very well how sincerely I love the subject, and that I will write and talk about it because I love it, and not from a sense of duty. Things done from a sense of duty are a sort of commodities we expect generally, in some way, mentally or morally, to get paid for their doing; but efforts in a cause one loves are satisfaction and pay in themselves.

Somehow my lines of life lead me more and more away from the old associations of the State Board of Agriculture and the Horticultural Society, and I am very sorry for it, but I hope to get back again to the country—to Arbor Lodge—among the orchards and groves permanently. These cities with sewer smells and ballroom perfumes, paupers and princely extravagance, with good people begging and starving, and hard-faced knaves governing and lazing in luxury, all mixed up in social sausage, do not suit me. There is more pure air, more health, more real happiness on a forty-acre farm in Nebraska than there is in a dozen blocks of brown-stone fronts in Washington. The veneering is in metropolitan, but the real oak of comfort—the solid wood—is in rural life. We who are obliged to be out of Nebraska and in other states the oftenest learn the most correctly how to estimate the soil, climate, water, and health which Nebraska generously gives everybody. It is the best place for a home in the American Union, and there are more bright days in a year there than anywhere else that I can find out about. You, nor I, nor any other old settler, ever half appreciated the capabilities and advantages of the state.

Hoping you are well, sending regards to your family and my regrets to the members of the Society whom I know, I am as ever

Faithfully Yours,
J. STERLING MORTON.

J. T. Allan, Moses Stocking, and V. C. Utley, were appointed committee to report expressions of this society at the death of C. H. Winslow, who died August last. The committee in due time reported as follows, which was adopted:

IN MEMORIAM.

And here we may "list to nature's teachings." The study of Horticulture resembles that of human life. The early, promising growth of the plant in the spring time, blooming and flourishing during the summer, ripening its seed in the autumn, and, having fulfilled its mission, dies at the approach of Winter. So the horticulturist lives, labors, and dies, and, as the plant, furnishes seed for a new and superior growth, so his works follow him. These thoroughly remind us to work while the day lasts, sow the seed of knowledge, and those who follow will reap the harvest. As the greatest horticulturist of the United States has said, "Let us remember with gratitude that the Great Disposer of events, who has removed our co-worker, has spared us to labor together for the advancement of our cause and the good of mankind." Death has opened for him, as he will for all of us, the gate to the higher mysteries, the clearer and grander scope wherein he grasps the full extent of things he knew here only in the outline, and through whose portals vanishing, he is lost to human sight. To-day he rests from the toil and labor of life, and we trust has found joy, and rest, and peace in the eternal gardens of God."

Horticulturists are like travellers tending toward the same destination. No matter from what part of the world they started, they are naturally drawn together. So the members of this society walk side by side in the pleasant paths of horticulture. Now and then a wearied one lies down beneath the cypress, to rest till the great awaking.

As the years succeed each other, nature decks his resting place with verdure and flowers. Summer's sun or winter's blast affect him not; still his companions in the journey of life move onward till they are hidden by the mists of futurity. Since our last meeting, one of our number (as a great and departed lover of horticulture said) "has been called to join that innumerable caravan which moves to that mysterious realm." I refer to the death of Hon. C H. Winslow, of Cass county. His ardent labors to advance the cause of horticulture in Nebraska make it our duty to connect his memory with this society and the state.

Adjourned to meet to-morrow at 10 o'clock.

JANUARY 23d, 1879.

Called to order as per adjournment.

The following letter was read from Wm. Saunders, of the Agricultural Department, and honorary member of this society:

DEPARTMENT OF AGRICULTURE,
Washington, D. C., Jan. 6th, 1879.

ROB'T W. FURNAS, ESQ.:

DEAR SIR—Instead of writing an address, for which I have but little time and less ability, I propose to refer to one or two matters which seem interesting. One of these is the question of rotation of crops. I think it very probable that, at a very early period, cultivators would observe that a plant, or rather a particular crop, would not grow profitably in the same place for any very long series of years. Land would become *clover sick* then, as it is said to do now, and a rotation of crops would naturally be suggested. But while we recognize this fact as bearing upon our cereal and other annual crops, we do not seem to recognize it as a factor in the failure of our more permanent crops, such as those of the orchard and vineyard. It is, however, regarded as having an important bearing in the nursery treatment of trees. Nurserymen find that they cannot produce suitable, salable two year old trees, if they confine their crops to the same soil, even with extra care in manuring; consequently *new* land, as it is termed, is selected for a crop of pears, apples, peaches, etc. The same applies to grapes. I find that if I select a portion of ground upon which grapes have probably never been grown, and plant it out in young newly rooted plants, they will grow from 3 to 5 feet in length the first season. These plants being lifted in the fall, the ground received at the rate of 20 cords of well rotted manure to the acre, is well worked, and is again planted in early summer with grapes as before. This season the plants will grow from 18 inches to 3 feet. Try it a third year in the same way, and the growths dwindle down to a foot or so. This is not the result of a single trial in one series of years, but is the result of 20 years careful observation and practice directed to this particular operation of growing young grapes which are yearly removed from the soil. The same result follows even the growing of verbenas, petunias, etc., in the flower garden, and we well know that a similar result attaches to cabbages and other crops in the vegetable garden.

Now, the question seems naturally to arise from these facts, What occasions this deterioration in the growth of plants? Of course, if we ask a chemist, he will inform us that certain food ingredients required by the plant have been exhausted. This tale he "tells as 'twas told to him," and he repeats it, but that is not proving it to be a true answer.

It has an important bearing on many of our permanent cultures, such as vineyards. We may ask, if young grapes suffer when grown in the same soil for even three years, how can it be expected that a vineyard shall continue healthy for a half century? The answer has to be, that however frequently we may hear about vineyards remaining productive for such lengthened periods we rarely see them. On the contrary, we seldom see a ten year old vineyard in good health, generally after five or six years, they degenerate and prove inferior to their earlier fruiting.

Will we be forced into rotative cropping with regard to grapes and orchard fruits as well as in culinary vegetable crops? Perhaps it may yet be found to be the most profitable method. At all events it may be worthy of consideration, whether or not the best mode of growing the large fruits will be to set the rows much wider apart than is done at present.

In setting out an orchard of apples for instance, I would suggest planting two rows, say 25 or 30 feet apart, the trees being about 20 feet apart in the rows. Then leave a space of 200 feet before setting out another double row.

It strikes me that perhaps plants return something to the soil which is not favorable to them as food. Thousands of small spongioles and fibry roots die annually in the soil, which may be hurtful to the plant that produced them, although not injurious to plants of a different kind. And this again may be more immediately hurtful in retentive soil, as it may be leached out more or less in gravelly or sandy soils. One thing is certain. The exact specific relations that exist between the soil and the plants that grow in it, is not fully known, and there is a wide field for observation in this respect.

I intended to make some remarks about seed, the necessity of change of seed—the loss occasioned by carelessness in not sowing only the best seed, etc., etc., but I cannot do so at this time. Seed brought from a southern to a more northern location produces earlier crops, and two or three bushels more per acre can be insured by careful selection only of the best seed to sow.

Respectfully,

WM. SAUNDERS.

Prof. Aughey said in relation to the rotation of crops, ably treated in the paper of Mr. Saunders, that he had examined the soils, etc., in Germany and in the vineyards along the Rhine. A vine was taken up with all its leaves and fruit and analyzed, showing what food the plant needed, which showed what should be supplied. A law of nature cannot be violated; long cropping without a return will exhaust the soil. The trees and flora of Greenland and Iceland have changed three times. On the very lands where we now live have been found eleven varieties of the sequoia—the mammoth tree of California—showing that these trees lived and flourished here in the tertiary period, and there is no doubt but that once this was a great timbered region. It is a noticeable fact that when native trees fail, have eaten up the elements on which they subsist, a new species springs up which finds different food suitable to its wants.

President Furnas said all tended to show that to encourage plant growth it was necessary to furnish plants food of the kind and quality they demand.

Col. Mathewson said he knew of one vegetable which was an exception, and that was the onion. In New England, the great field where it was raised, there were fields which had been planted for sixty years in succession with a full crop. Perhaps they are yearly drawing out of the soil something not wanted in onion culture and leaving what was necessary.

In answer to inquiry of Mr. Kaufman, Prof. Aughey said that when forests flourish and grow for ages and then die and rot, the material, much of it, passes into the atmosphere, while inorganic matter is washed away and trees spring up adapted to the changed soil.

On Wm. Saunders' paper, Prof. Culbertson said:

The question of tree planting for home adornment I regard as an important one. No person can pass a residence that has taste exhibited in the planting and arrangement of trees and shrubbery without at least having his attention more or less attracted. He may not be able to say just what thing drew his attention, but he will know the place in the future by the common term of a nice place.

There are many interesting things about trees, their growth of roots, trunk, branches, and leaves; the materials they get from the soil and air; the changes that take place in the tree; the various uses, etc. A knowledge of these things aids much in stimulating the desire for trees.

The planting of trees for ornamental purposes, and the planting so they may be ornamental, is something very desirable, and our people ought to give more attention to the subject. Our public and traveling men see many beautifully arranged grounds and tastefully kept trees; they write many articles on the beauties of properly arranging grounds. These older persons take an interest and much pleasure in the beautiful things of nature. What we ought to be interested in is, how to get the young people and even children to study and love trees and flowers as well as the many other things they undertake with so much zeal. Young people can enjoy solid instruction when it is brought before them in a simple way. Get an interest awakened and a great many little things may be gathered in that will be remembered for life.

One of the methods which might be used to interest our young people in tree planting would be for parents to give their children a tree or two to plant, teach them how to plant it in the best way, help them a little if necessary, watch the unfolding buds, open the buds before they come out themselves and show them the little leaves rolled up, tell them that heat, moisture, etc., are necessary to make the buds open and the little leaves expand; tell them what the leaves are for; have them collect leaves from various trees and note the differences; note that the leaves on the same kind of trees have the same general characteristics; show them that the leaves of trees are constantly evaporating moisture, by taking them off and see how soon they dry when exposed to the sun, and that which prevents them from doing so on the tree is because they get water from the roots. So we might go on enumerating things that might be attractive to children.

Gov. Furnas said that grapes needed especially bone food, and that when young; bury bones deep the roots would strike down. Had good success with the Delaware.

Prof. Culbertson moved that the subject of peach culture be taken up for discussion, and called on the president, who said he had planted the first budded peaches in the state and with success. At the Richmond meeting of the American Pomological Society, the experts said our peaches were of the Chinese strain, not the Persian, which is grown in Europe and in our eastern states. These are more liable to reproduce like, as the seeds are planted. We thought that seedlings were most reliable, but a careful selection of budded varieties furnished fruit which sold at from $3 to

4$ per bushel, while the seedlings, although better bearers, only brought 25 cents to $1 per bushel. Would recommend the following: Troth, Hale's Early, Crawford's Early, Crawford's Late, Stump the World, President, Newington, Free, George the Fourth, Jacques' Rareripe, Morris White, Heath Cling (late), Salway (late). For location, should be the highest ground; prefers western and northern aspects to delay early budding in the spring; would approve of heavy mulching after freezing of the ground to delay early blooming; would prefer 32 feet apart for apples with peaches between; culture between while the trees are young is important; would not cultivate after August; like other fruit trees would advise seeding down the orchard; don't advise planting seed where the trees are to grow, thinks it better to transplant.

A member said, had transplanted the past year some 100 peach trees 3 and 4 years old, heading them well back, which had made fine heads.

President Furnas said here, education was needed in pruning; no two trees could be pruned alike; it was necessary to note the habit of the tree and what shape you wish, and ask nature to agree with you; should be systematically trained early. Has not found much damage from borers. As to the degree of cold peaches would endure, would remind the Society of the winter of '73 and '74, with the thermometer 32 below, but the peach crop was never better; the present winter, with 27 below, think there is still a prospect of a good crop.

Mr. Wheeler asked did not the late ripening of the wood the past season aid?

Mr. President said he believed that means should be used to cause thorough ripening, say cutting back the last of August, or at furthest, before the first frost. Advised evergreens interspersed among fruit orchards.

Mr. Snell found that those transplanted succeeded best, in which the president coincided. Mr. Morton's peach trees are 20 years old.

Mr. Utley had 16 year old trees still hale and hearty; found fall budding the best.

Mr. Kaufman had tried wood ashes about peach trees and believed that the alkali would prevent borers; had tried two adjacent rows, the one treated with ashes safe, the other full of borers.

Mr. Stephens had been successful with coal ashes about pear and peach trees.

Mr. Kaufman found that iron filings around pear trees helped the growth of the trees and fruit, but did not prevent blight; his pears in blue grass sod did not blight, but he did not think the man was born who could tell the cause or cure of pear blight.

Mr. D. W. Kaufman read a very excellent paper on plum culture. In answer to question about curculio, had found the smoke of coal tar would prevent insects on the trees and had saved a crop by this means.

Mr. Snell asked if planting seeds of native plums they would reproduce like varieties.

Mr. Kaufman thought they might; there were some cultivated plums now once natives. Had found the wild goose inclined to sport; it generally bore in three or four years. Recommended for general culture Green Gage, Imperial Gage, Washington, Jefferson, Coe's Late Red, German Prune, Shropshire, Damson, Lombard, Quackenboss, Peach Plum, Smith's, Orleans, Bleecker's Gage, Miner, and Wild Goose. Believed plums would prove a profitable crop here.

Mr. K. also said, aside from the curculio he had used the coal tar smoke with success against the codling moth.

Mr. Louder, of Indiana, being called on, said he was glad to see so many interested in horticulture. This organization to be educational must give the farmer and fruit grower information true and practical, and not leave it entirely to the tree peddler or the nurseryman. Work for the interest of the general planter and when you tell him what to plant give the reason in an honest opinion. If they want a commercial orchard, select large bearers, though they may not be of the extra fine quality. If for family use select some more choice kinds, which as a general rule are shy bearers. For market the Golden Russet is No. 1, as a long keeper. Smith's Cider is called a second-rate apple, but for market purposes you will find it good.

Question—How many varieties for family use?

Mr. L.—Five or six for summer and fall, three or four for winter, and then Golden Russets and the like for spring; twelve or fifteen kinds in all.

Mr. Barnard for summer apples puts Red June at the head and next Summer Pennock.

Mr. Kaufman highly recommended the Pennock.

Mr. Craig said Red Astrachan bears well every other year, and like Red June ripens gradually for marketing, the last gathering usually the best.

On Mr. Culbertson's motion to print forty thousand four-page pamphlets, giving the revised fruit list, etc., Mr. Stocking said: I heartily endorse the remarks of Prof. C. in regard to the dissemination of the much required information both as to fruit and forest planting, and could endorse the statements made as to the damage done these interests by tree-peddlers. Believe that our state nurseries should advertise more.

Mr. Louder, of Indiana.—Am not engaged in tree peddling; have known the same trouble with tree-peddlers and even among our home dealers; many nurserymen buy grafts which they honestly believe true to name and he finds after that the seller, an honest man too, perhaps, has made a mistake; the greatest care should be exercised. It has occurred to me that perhaps the time would come, and perhaps soon, that you might have to district your state, as some fruits which might do well in the northern might not flourish in the southern, so perhaps a northern, middle, and southern division might each have special varieties. And again, as I believe, it will occur you will find an extended fruit region to the west perhaps of the hundredth meridian, and again it might be of advantage to district the state in three divisions from east to west. Believed that the endorsement of your fruit list, qualities, and mode of planting would be well received by the masses whom you wish to reach; and your planter, if he wanted a commercial orchard, would find the Ben Davis, Smith's Cider, etc., recommended, and so others for family use.

Mr. Utley, in regard to fraudulent tree-sellers, said he did not expect to see the time when people would not submit to be gulled, but once burned they might learn.

Prof. Thompson thought, aside from the plan of Prof. C., to distribute these circulars by the assessors, the press of the state would publish the matter, which would be of interest to every reader.

Mr. Schroeder, of Lancaster County Society, said he knew there were thousands in this state who will thank this Society for this movement.

Gov. Furnas said short paragraphs in newspapers were read more than long articles; so small pamphlets spread widely would find the greatest number of readers.

The following paper from Dr. Jno. A. Warder, of Ohio, President of the American Forestry Association, and honorary member of this society, was read:

THE HARDY CATALPA—BIG NONIOIDES—VAR. SPECIOSA.

This remarkably beautiful flowering tree has recently occupied so important a place in the lists of our sylva, since Mr. E. E. Barney, of Dayton, Ohio, has presented its claims to the people of the United States, that everything connected with it is possessed of interest. Hence no apology is offered for the following observations respecting its behavior in Illinois, Iowa, and Nebraska.

It may be premised that this variety was first noticed at Dayton, Ohio, on account of its beautiful flowers and the upright habit of the tree, and described with its variety name in 1853. The origin of the tree was then and still continues to be unknown, but since it has been found elsewhere it is considered an original or native form.

In company with a dear friend and a true lover of trees, a little pilgrimage was made in September to certain spots where the catalpa is cultivated. The first point, our Mecca, indeed, was the home and grounds of that very interesting patriarch among western tree planters, and their biogropher, Arthur Bryant. Here were catalpas grown from seed he had gathered at New Madrid, in 1839. One of these stands on a lawn near the house, rearing its symmetrical head fifty feet or more, and supported by a noble stem that is three feet in diameter stump-high. This is a veritable *speciosa*, and has proved perfectly hardy, though the trees of the common variety have again and again been cut off by severe winters in different parts of the vicinity of Princeton, Ill.

The next point of interest was reached by retracing our steps to the Illinois Central, down which we proceeded to the south line of La Salle county. From station New Rutland, we drove six miles westwardly to the residence of John Litchfield, an old settler from southern Indiana, where we found a small grove of trees grown from seed sown 22 years ago. Though crowded, neglected, closely tramped by hogs and other stock in a feeding yard, some of these trees had made a good growth and seemed perfectly hardy. The wonder was that they had survived so much hard usage, but there they stand, and furnish seed from which other plantations have been produced. These are manifestly trees of the variety *speciosa*, as are all their progeny seen in their neighborhood. The original seeds were sent at Mr. Litchfield's request from the trees growing at his old home in Vanderburg Co., Ind., presumably natives there. So here is another group distinct from those of Dayton origin, while that is the source of all the trees distributed by the brothers J. and E. Y. Teas, Indiana nurserymen, who where among the first to cultivate and distribute them from that focus. Mr. Litchfield has a grove at some distance from his house, occupying one and a half acres on a clayey rise in the midst of a forty-acre prairie pasture lot. The trees stand 6x8 feet apart, are fourteen years old, tall and straight, about 40 feet high, and perfectly healthy, showing no injury from frost. The cattle have spent much of their time rubbing and tramping among these trees, and the seats of a camp meeting show that the place has been occupied by human tenants at times for the shelter afforded by the leafy canopy, but nothing seems to have damaged the plants. Indeed this is a pattern grove, altogether the most perfect of any of the many plantations examined on this extended tour of forest visitation. Smaller groves were seen in the neighborhood, and we were told of others near by, all grown from seeds produced by Mr. Litchfield's original trees.

Our good friend, Suel Foster, of Muscatine, Ia., disclaims the credit of discovering the hardiness of the *speciosa* variety of which he has one specimens, saying that it was due to the observation of his partner Morris, who told him one spring that there were certainly two kinds in the nursery, as all of one sort were dead, while the other had withstood the rigors of the winter. Many trees were seen in the streets and gardens of Muscatine, all seeming to be the *speciosa* variety, which, under the name of hardy catalpa, is said to be considerably cultivated all through that portion of the state—in latitude 42 and perhaps further north.

At Omaha, Neb., several trees of catalpa were found. They appeared to be of both forms, and some of them seemed to have suffered from the winter or other cause. In one dooryard were two trees, one of which was a *speciosa.* Without admitting our recognition, the owner was questioned in regard to the trees, and though leading questions were avoided it became immediately apparent that the difference had been observed and was fully appreciated by the proprietor. Afterwards, when visiting the groves of J. T. Griffin, near the city, some of which had been planted among the first west of the Missouri river, it was discovered that he had both kinds of catalpa, but that the tender variety had suffered from the cold on the high rolling prairies while the *speciosa* had escaped injury.

At Nebraska City, and at Brownville, fine trees of *speciosa* seen, and the same variety was reported at Plattsmouth. The farthest point westward at which the catalpa was observed on this tour, was Lincoln, the capital of Nebraska. The trees in the capitol grounds were too young to be diagnosed with certainty, but the impression received upon their inspection was that they were *not* of the *speciosa* variety.

The great merits of the catalpa, the beauty of the flowers of the *speciosa* kind, the tint and surface of the timber for joiner work. the wonderful lasting quality of the lumber, now fully attested, and the rapid growth of the trees, make this species worthy of being extensively planted by those who would clothe the prairies with trees.

JNO. A. WARDER.

North Bend, O.

The following from Suel Foster, Muscatine, Iowa, honorary member of this society, was read. Subject:

CLIMATE—DRY COLD WINDS—TREES TO MODIFY.

When I first came to the wild, unsettled country of Iowa, in 1836, the great objection to the beautiful prairies was the want of timber. I had travelled some in Illinois, and found that where trees had been planted, they grew thrifty and nice, varieties good both for farmer's and mechanic's use. I was not long in concluding it was easier to raise an acre of timber than to clear off one of woodland.

We do not seem to realize the value of timber trees as a protection against the sweep of winds both in winter and summer. To-day, as I walked up from the city through a short space of road with a fair sweep of a "polar blast" of 18° below zero, it was very disagreeable I assure you. As I neared the corner of my own premises, where the majestic, pines, and Norway spruce stood guard and protected me, the vigor of the blast was greatly modified. The haunts of the Indian savage are in the woodland, so with the wild beasts, how long will we wait to plant wind-breaks? I learn that many in Nebraska have begun the work. Will they continue the good work until they shall have modified the force of wind in orchard, barn, house, farm, and every hill of corn and blade of grass? Judge Whitney, of Iowa, has given his valuable experience with wind-breaks. He says crops are perceptibly better for forty rods in every direction from a tall wind-break.

What shall we plant? Willow and cottonwood first. Set them for line posts where a fence is wanted. When large enough fasten a wire to; take smooth fence wire, and cut in pieces six feet long. Make a hook in one end, and loop on the other. Drive a round stake in the ground, one to two inches in diameter, and wind the wire around the stake except a few inches at each end, so as to make an expansion band for the live growing tree posts. Then take a stake of any sort that will hold staples, or nail boards, or rails to, if you wish, and fasten the stakes to the tree with these elastic wire bands. Then put up the fence and let the tree stretch. For cottonwood or willow, probably the wire should be more than six feet. No doubt you have all heard of the wonderful catalpa. I scarcely feel competent to speak of all its excellent qualities. I know that here, at Muscatine, it is hardy, not having been injured for the past twenty-four years, during which time the the thermometer has been as low as 28° below zero. I never saw a twig of it killed. I know that it is a rapid grower, about as rapid as soft maple. It transplants readily as a cottonwood. As to durability, I take the word and experience of E. E. Barney, Dayton, Ohio, who sent me a specimen which was known to have stood in the ground seventy-five years. We have abundance of evidence of those living in the south part of Iowa and Illinois, of its exceeding durability. The wood is light and porous as a chestnut, and tough and stiff as white ash. Plant the catalpa, for I am sure it is the best tree known for us.

For groves, I would plant catalpa, larch, white ash, black cherry, black walnut. If one has plenty of these fine varieties it will answer all purposes. There is no use trying twenty other inferior varieties, where those named do well. So with apple trees, no nurseryman can ever atone for the injury done by propagating varieties not suited to our climate. The Ben Davis has proved the most profitable of any variety I have raised, although of second rate as to quality.· The wealthy would drive it out of the market if it would keep as well. I will not attempt a list of fruits for Nebraska. Your own experience, and your agricultural and horticultural colleges will soon instruct you in this respect. Every farmer ought, annually, to plant trees for fruit and for wind-breaks.

The Society proceeded to annual election of officers, which resulted:

Robt. W. Furnas	President
Chas. Mathewson	1st Vice President
E. N. Grennell	2d Vice President
Chris. Hartman	Treasurer
D. H. Wheeler	Secretary
Sam'l Barnard L. Crounse D. W. Kaufman	Directors

Robt. W. Furnas, D. W. Kaufman, E. N. Grennell, V. C. Utley, and H. Y. Craig were appointed a committee to prepare premium list for coming fruit exhibit at state fair.

After discussion on select apple list, Sweet Bough and Duchess of Oldenburg were added to the Summer varieties; Porter, Peck's Pleasant, and Bailey's Sweet to Autumn; Jonathan and Willow Twig to Winter.

A vote of thanks was tendered Dr. Warder, of Ohio, Dr. Furnas, of Indiana, and Mr. Spofford, of Illinois, for services as awarding committee at state fair in September last.

Chas. Louder, Plainfield, Ind., and Miss Mary Stratton, Lincoln, Neb., were by vote made honorary members of this Society.

Robt. W. Furnas, Saml. Barnard, E. N. Grennell, Hiram Y.

Craig, V. C. Utley, and J. T. Allan were appointed a committee to prepare and have published in circular form the select apple list of the Society, together with the recommended list of all fruits passed upon by the Society, and also brief directions as to planting and treatment of growing fruits, soils, locations, etc., etc.

Account of R. W. Furnas, president, stationery, postage, and express charges, $7.50, presented and allowed.

Account of D. H. Wheeler, secretary, similar items, $6.35, paid.

Treasurer's statement submitted, showing $52.75 received, $36.50 paid out, and $16.25 on hand.

LINCOLN, Sept. 12, 1879.

Board of Directors met in parlor of Commercial Hotel. Present: Furnas, Grennell, Barnard, Wheeler, and Hartman.

Ordered, That the president and secretary certify to the state auditor, in accordance with requirements of law, sums necessary to pay premium lists of Fall and Winter exhibits, and obtain appropriation made by legislature for that purpose.

Ordered, That fruit and flower exhibit be made at Winter meeting of 1880, and premiums awarded.

Furnas, Barnard, and Grennell were appointed a committee to prepare and publish a premium list for Winter meeting and exhibit.

Ordered, That the sum of two hundred dollars, or so much thereof as may be necessary, be appropriated to prepare proceedings of 1878 and 1879 for publication in book form, for publication of circulars as heretofore ordered, and the incidental expenses that may be required to give the public the benefit of the labors of this Society.

REPORTS.

PAWNEE COUNTY.

BY SAM. BARNARD.

To the President and Members of the State Horticultural Society:

As it devolves upon me as chairman of District Committee from the 1st district of the state to report upon the condition, progress, etc., of horticulture within my district—a matter that deserves credit second to none—I may here say that we have very much to be proud of in the rapid strides Pawnee county has made within the past six years, or since we have been supplied with native-grown trees. But six years ago the husbandman had to either plant foreign stock or not plant at all, and by far the greater number resorted to the latter remedy, and many more there were (wise in their own conceit) that claimed our supply of fruit must come from east of the Missouri river, and in some instances testified in court that a cottonwood was worth more than an apple. But, like all new countries, there are pioneers with energy and foresight, backed up with ambition, that twenty years or less ago saw blossoms of fruit cropping from the soil of Pawnee, and set to work with the best appliances at hand to develop fruit, and to-day, *thanks to their energies*, feasting on as fine apples as the eye of man ever beheld, and not in meager amounts, but in quantities whose proceeds more than equal the balance of their incomes. I know some may think me visionary. I am prepared to furnish facts and figures to the doubting. But the above cases are not a majority. Again, we drop from earliest settlers to more recent date with an increased population of fruit-loving people who settled in this county about ten years ago, many of whom desired among their first investments an orchard, and were easily ensnared by the roaming hyenas, under the guise of respectable tree venders, into buying large bills of trees, etc., which, in connection with unfavorable seasons, proved in many instances a total failure. Thus another drawback to Pawnee county fruit interest; and in 1870 a man might consider his life in danger if he were known as a tree dealer by the anathemas poured out by our citizens upon such individuals, and their wrath was only held in check by handling them carefully and making a home among them, and grow trees where they could come and see them dug, and made sure they were grown in Nebraska and upon such soil as only a few years ago was only considered fit for pasture for the squatter's stock along the water courses.

Since 1871 there has been planted in this county and closely adjoining it about 100,000 apple trees, grown in our soil and delivered from our grounds, and guaranteed to grow; and with drouth, and grasshoppers, less than 10 per cent will cover all losses. The planting of 1871 showed well-matured fruit the past season, and some even of later planting. The spring of 1877, although very wet and backward, about 15,000 apple trees were planted in orchards in this county, and with unprecedented success, reports showing an average loss of not to exceed one per cent, trees planted the previous two and three years making an extra fine growth and ripened the wood to the terminal bud, and upon older trees the fruit buds are finely developed, and seem in perfect condition. And with good crops of apples the last few years pomology is likely to take a fever almost bordering upon an epidemic. What is said of the apple can be said of the peach and small fruits in general. The strawberry crop of 1877 was simply immense where grown ; the blackberry something more than a half crop. Raspberries damaged by excess of rains in spring, followed by drouth in June and early in July, or at ripening. Considering everything, the outlook of fruit from this county is most flattering, and the observer can see a marked improvement in the general interest manifested in securing and caring for the orchard. I might add that in September of 1877 the first regular Horticultural Fair was held in this county. The exhibit made about 260 plates of apples, 10 of peaches, a few of pears, besides grapes and very many products of the garden ; a show that would bring the blush upon the cheeks of many of our eastern sisters. Hedging with the osage is meeting with much favor. There was set about 50 miles of new hedge in the county in 1877, which is a fine stand in general, some reporting a loss of less than ten plants to the mile, with average growth of two feet, and I feel safe in saying that, with the present interest manifested, in a few years this county will be second to none in amount of miles of hedge or quality of the same, as it has been clearly demonstrated that four years is sufficient time to grow a hedge that will make a barrier against all kinds of stock, both home and foreign.

Timber belts and groves have generally made good growth the past year. The cottonwood in some cases has disappointed expectation, having died out the past season from some unknown cause, probably from a lack of maturing the wood in 1876, followed by severe late frosts in spring of 1877. I find no insect which would likely be an enemy unto death. The ash and maple have done finely, as well as walnut birch, and the French Osier willow.

I regard the future of Pawnee county as a bright one, and all that is needed is more care in cultivation. *Thoroughness* and vigilance against animal and insect depredations, better education in our husbandry, and success will be the certain crown.

DIXON COUNTY.

BY EDWARD ARNOLD.

In reply to a circular of the society of a recent date, I beg leave to report:

1st. That the number of fruit trees and acres under cultivation in this county can only be approximated, there being no reliable data from whence to obtain information. There are probably 10 or 12 thousand trees set out, and in the aggregate about 100 acres under cultivation.

About four years ago our people with commendable spirit engaged in the cultivation of fruit. We purchased our stock from a man who claimed to own a nursery at Decatur, Burt county. It may be needless to say that he warranted his stock, but much of it was damaged, having been shipped to him from Bloomington, Ills., and Rochester, N. Y., as we afterwards learned. The writer received a consignment from him late in the fall of 1873, which he heeled in carefully before winter set in. His grapes, currant bushes and several varieties of berries were pitted. But the winter of that year ('73 and '74) was unusually severe, and some of the trees whose branches were uncovered showed unmistakable evidence of the rigor of the season when they were set out in spring. But the worst had not come until the summer following, when clouds of locusts blackened the sky, and left ruin and devastation in their course wherever they alighted. Apple trees were stripped of their foliage and girdled, and of 200 set out by me there are only three now living.

It will be seen from the foregoing that our losses have far exceeded our gains. But we are not discouraged. We believe fruit can and will be grown here, and that all we need is patience and perseverance. There are several young orchards in this county, but none in bearing that I am aware of. Many of our citizens who take an abiding interest in the matter have replanted their orchards with stock brought from Minnesota. The Minnesota two year old seedling has done well with me, it is hardy and vigorous and well adapted to this latitude. With proper care and cultivation, I am satisfied it will do well here. The varieties generally set out here are Duchess of Oldenburgh, Wine Sap, Northern Spy, Ben Davis, and White Winter Permain.

Our orchards are variously located, some having a northern and some a southern exposure. But I prefer the former for reasons which will readily suggest themselves. The uplands too, I believe to be preferable to the bottoms, because the temperature is warmer and the soil is not so rich, two things that in my opinion have an important bearing on the successful cultivation of fruit in this country. Of course, care and attention are among the primary conditions, and herein is where our people are chiefly lacking. But "experience keeps a dear school," and I hope they will learn after a while.

Now as regards modes of cultivation, we plant in rows twenty feet apart and cultivate as we do corn, keeping the weeds down and the soil mellow. Planting corn between the rows, I believe to be a good plan, as it prevents sun scald. But mulching in winter ought not to be neglected. It retards the flow of sap in spring and retains the moisture around the roots in summer.

With the view of ascertaining with some degree of accuracy the number of fruit trees set out, and the number of acres under cultivation in this county, I purpose applying to our county commissioners at their next meeting to instruct the assessors to list them this spring.

Hoping your meeting on the 15th proximo will be pleasant and profitable, and assuring you of the deep interest which I take in your proceedings,

I have the honor to remain, dear sir,
Your obedient servant,
EDWARD ARNOLD.

HALL COUNTY.

BY WM. STOLLEY.

To the State Horticultural Society of Nebraska:

According to the Assessors' Lists respecting growing hedges, artificial groves, and fruit trees, taken in the winter of 1877–8, the following statement is correct:

HEDGES	CULTIVATED TIMBER		APPLE TREES	PEAR TREES	PEACHES	PLUMS	CHERRIES	GRAPES
No. Miles	No. Trees	No. Tr's	No. Trees	No. Trees	No. Trees	No. Trees	No. Trees	No. V's
5½ miles; consisting of white & black willows and honey locust.	1031 acres	1,318,320	2151	108	4530 mostly seedlings	2398 mostly wild variety	498	524

But the foregoing figures would be probably *more than doubled*, as to several kinds named, had I the means at command to learn the number of trees, (as well forest as fruit) which were planted in this county during the spring and fall of 1878. Several thousand dollars worth of trees were shipped into this county last fall season, and it is only to be regretted that unprincipled and irresponsible "tree peddlers" furnished the bulk of those trees, instead of trustworthy and reliable nurserymen. Since the year 1876, when the greater portion of our young artificial groves and orchards (then in the best condition) were destroyed by grasshopper ravages, the interest in tree planting gradually revived again.

Most of the people have profited by their experience and plant now only such varieties as proved to be least damaged by grasshoppers, viz.: honey locust, soft maple, box elder, white ash, white elm, black walnuts, coffee-bean trees, white or gray willows, black willows, cottonwood, and of evergreens the native red cedar. Whatever was left of fruit trees in this county in 1876, was about to bring forth a good crop of fruit (in particular peaches) in 1878, but in July, we were visited by a very destructive hail-storm, which ruined nearly all our fruit.

Wherever good and sufficient wind-breaks surrounded orchards, the injurious effects of the hail-storm were not near as great as where the orchards were without this protection.

The cultivation of grapevines comes more and more into favor with the people here, and I think the eventual result of it will prove, that the grape justly merits an extensive cultivation in our state, the rot being an unknown disease with us so far.

For general cultivation in Nebraska, I would recommend the Concord, Clinton, Ives, and probably the Elvira. In the last named white grape I have confidence enough to cause me to plant quite a number of them.

I have sixteen varieties besides the foregoing on trial here, and also some Concord and Catawba seedlings, which promise fair, but it will take several years of further trial with them yet, before I feel safe in recommending either of them.

I prune my grape vines rather long in the fall, before heavy frost sets in, and if not covered, let them swing free. The vines are trained on wire trellises of five wires, 5½ feet high; the lowest wire eighteen inches from the ground. Thus, the securely tying of the fruit bearing vines as well as young shoots to the vines is done away with to a very great extent; whereas, the twisting of the vines in between the wires gives a sufficient hold, and thus, very much otherwise unavoidable and much time consuming labor is dispensed with.

For the four varieties aboved named, I find that winter covering is not absolutely needed, as they proved with me to be perfectly hardy. But I believe that in extra severe winters, it is profitable to cover them, and for covering I do consider old straw preferable to earth.

Since the year 1876, we have taken a new start in the planting of forest and fruit trees in Hall county, and those species of forest trees to be found in our natural groves are far more given the preference than before, and this I consider decidedly a move in the right direction, and sure to be followed by far more satisfactory results than heretofore obtained.

I notice in the lately issued programme of the State Horticultural Society, that Prof. Culbertson will address the society at their next meeting on the subject: "What can our Society do for the people?" To be followed by discussion. I am aware that the Professor will do fully justice to the subject he is to treat upon, but if proper for an outsider so to do, I would ask the privilege of offering a few suggestions on this point.

As I have mentioned already in the foregoing, people in this and adjoining counties have, notwithstanding the frequent warning to the contrary, been taken advantage of by unprincipled and irresponsible tree peddlers, and we may be pretty sure that several thousand dollars in cash paid out for trees have to a great extent been thrown away again, for comparatively worthless nursery stock.

This is not only so in this locality, but as every one knows, is repeated year after year, all over the western states. I enclose a circular sent here by a party unknown to me, who evidently has "been through the mill," and feels very bad over it yet. His attempt to frustrate the further swindling operations of those who got away with him is but natural and eminently proper, but his appeal and advice to the people carries but little weight with it, for the simple reason that he signed it: "A Nebraska Farmer," instead of boldly putting his name to the instrument and referring to a number of good substantial and well known men, who stand ready to testify to the truthfulness of what he says. It is evident that he does not like to fight a battle with swindlers "all alone." Hence he keeps his name in the dark, but hurls his bombshells from ambush, and who will blame him much for his precaution.

Now, I think it eminently proper for the State Horticultural

Society to look sharp after these fellows, who swindle the people at large, year after year—who do more harm to the successful growing of fruit trees in our state than all the obnoxious insects combined. If the accusations made in the circular I have enclosed *are true*, the State Horticultural Society should give weight and character to the much needed and very proper warning, by exposure of such and similar swindlers in connection with horticultural interests of this state.

A sort of vigilance committee should be appointed by the society, whose members will be on the lookout for all such confidence swindlers in every county, and who should promptly report to headquarters, from whence timely and proper warning should be sent into every portion and section of the state, *for the benefit of the people.* Such warning given by the State Horticultural Society—naming parties and exposing them properly—will end all such wholesale and retail swindling schemes soon, and will benefit the people to a great extent.

It will then not be easily accomplished by this class of eastern nurserymen to sell a single common rosebush, broken and bruised, for $5.00 a piece, and pocket the money as was done in this county with one party last fall.

Hardly any one will buy from parties who are on the *black list* of our State Horticultural Society, if this only be known.

Respectfully submitted by

WM. STOLLEY.

SAUNDERS COUNTY.

BY A. E. JENKS.

Notwithstanding the many failures in attempting to raise apples and other fruit in this county, farmers are pushing the good work, with prospects of success. Having learned the causes of failure, they know better how to avoid them. That this county is well adapted for raising fruit, no one at all familiar with the business can doubt. Of apples there are but few bearing trees; some of them have done well. In 1873 I sold William Saunders, Esq., six apple trees, that commenced bearing in 1875, and in 1876 were loaded with fruit so as to make it necessary to prop them. They are a summer variety. But not keeping a record, he was not able to name them. It is so with most of the farmers who have planted trees. For that reason I will not attempt to name the best varieties for our soil and climate. I think there are but few varieties generally recommended by the western fruit-growers that will not do well here. The Early Richmond cherry does well. Plums grow well, but have not borne much. Peaches do well sometimes, but cannot be depended on. Pears, I think, have been almost a total failure up to the present time. Of small fruits, raspberries and strawberries are doing well. Currants do well with some, but are an uncertain crop. Blackberries have not promised much. The Concord grape does well. Forest trees are largely planted, and of different varieties. It would be difficult for me, at this time, to make an estimate of the number planted, either of fruit or forest trees. If all the counties are doing as well as Saunders, the time will soon come when the State will have fruit and timber to supply our more unfortunate neighbors in the States.

SECOND JUDICIAL DISTRICT.

BY S. R. THOMPSON.

Your committee, to whom was assigned the duty of reporting on the condition and progress of horticulture in the second judicial district, beg leave to say that we have been unable to procure the material for anything like a complete report.

The best we can do is to give some isolated facts and opinions, as may suggest the drift and scope of horticultural effort.

First, we give some facts and statistics:

Mr. E. H. Burches, of Brownville, reports as the result of a careful canvass that in Brownville precinct, in 1877, were planted 2,271 apple trees, mostly four and five years old; and 1,230 peach trees, one and two years old. There are in the precinct 124 acres of bearing orchard.

Mr. C. H. Winslow, of Mount Pleasant, Cass county, reports that 13,000 fruit trees and 1,500,000 of hedge plants were put out in that precinct in 1877.

Dr. A. S. Root, of Eight-Mile Grove, Cass county, planted 125 apple trees, 50 cherry trees, 1,600 walnuts, and 1,000 cottonwood.

Mr. J. W. Shannon, of Plattsmouth, Cass county, reports he delivered for planting in 1877 15,000 standard fruit trees, and 2,000 grapes, currants, etc.; also 500,000 hedge plants.

The above are absolutely all the statistics of fruit trees planted we have been able to obtain. There is no reason to doubt that other precincts did as well as the few heard from, but this is only conjecture.

Some instances of success in growing fruit are worthy of special mention:

Mr. J. W. Shannon tells of a single tree that produced, in 1877, 20 bushels of Ben Davis apples.

Mr. E. H. Burches tells us of an apple tree planted in 1868 which in 1877 yielded 15 bushels.

Mr. Benton Aldrich, Clifton, Nemaha county, states that from 54 trees, Cooper's early white, planted in 1869, he gathered in 1877 324 bushels, which sold for $264.40. The trees were planted at two years old, 20 feet apart, which would make the yield per acre about $500. Some of these trees were 27 inches in girth, 16 feet high, with a spread of branches of 18 feet.

Mr. A. L. Harmon, of Nebraska City, reports 500 young trees occupying eight acres, which in 1877 yielded 400 bushels, sold at 70 cents per bushel.

Mr. Alex. McKinney, of London, Nemaha county, has six acres in orchard, four of them bearing. His crop in 1877 was 600 bushels, which sold for 75 cents in orchard. One tree bore 20 bushels.

Mr. W. J. Hesser, Liberty Precinct, Cass county, reports that there are between 300 and 400 acres in orchard in that precinct, though but a small portion is bearing. He estimates the crop of 1877 at 2,500 bushels, sold at an average of one dollar per bushel.

Mr. Richard Kesterson, London, Nemaha county, reports 10 acres in orchard eleven or twelve years old, which has been bearing some for four years. My fruit sold at from 50 cents to $2 per bushel, the latter for "Keswick Codling." Early Harvest brought $1.50 per bushel.

Mr. Joseph L. Gray, of Palmyra precinct, Otoe county, reports 181 trees in orchard nine to fourteen years old, and generally bearing.

Mr. Bath, of London, Nemaha county, had an Early Pennock apple tree planted in 1864, bore in 1877 21 bushels.

We now give a variety of facts, experiences, and opinions gleaned from the correspondence of the committee. For the convenience of comparing opinions we classify them under the following heads:

1. Mode of planting and cultivating.
2. Pruning.
3. Protection.
4. Insects.
5. Kinds.

1. AS TO MODE OF PLANTING AND CULTIVATING.

Mrs. Jane Loveless, London, Nemaha county, who has 30 acres in orchard, 2,200 trees 15 years planted, does not believe in cultivating much, and *never* late in the season. She fences in the bearing orchard and pastures hogs in it till apples are ripe.

Mr. J. F. Doud, of Plattsmouth precinct, would dig holes in the fall, three feet square and two feet deep. Before setting in the spring throw in a pail of water, making half a bushel of mortar to set the roots in. Mulch with rotten straw around each tree. In dry seasons cultivate the ground well; if wet, let the weeds grow, and take up the surplus moisture which tends to give the trees too succulent a growth, and renders them liable to be killed by freezing.

In three or four years seed down to grass.

Ashes spread on the ground are good for apple trees.

Mr. J. L. Gray prefers to plant 22 feet apart each way, and four inches deeper than in the nursery; lean the trees to the south; cultivate as for corn and manure when coming into bearing.

Mr. A. McKinney says: "If I were going to plant another orchard I would set the trees 24 feet apart, on northern slope, cultivate and manure the ground well for three years, and then seed down.

Mr. Richard Kesterson says: "I dig holes in fall, throw top soil on one side, sub-soil on the other; dig my trees in the spring when the buds are swollen, keep the roots moist, throw in top soil first; then, according to loss of roots, tread low. Cultivate well or mulch, or both, the first year. Next year cultivate early in spring and quit early. After four or five years quit cultivating, and for the next two or three years mow the land late in summer, then sow to grass.

"When trees sprout much around the roots it is a sign of disease or insects. Dig around such trees down to the roots; cut off the fungus growth and dead roots. When I have trees barked I wrap with a piece of some thick material as quickly as possible."

W. J. Hesser says: "Were I to plant again I would put trees two rods apart, and three peaches to one apple tree or pear tree. Peach trees make an excellent wind-break, and will be out of the way by the time the apple and pear trees need the room. My trees are now 23 feet apart."

Mr. E. H. Burches says: "Some of our peach orchards have been planted in alternate rows in the apple orchard, with the intention of cutting out the peach tree when it crowded the apple tree, supposing always the peach tree to be so short lived that its bearing time would be over by the time the apple tree required the space. This proved to be an error, for we see the peach tree at that time at its best, with no signs of decay or death; even the borer don't seek its destruction; and the apple tree of six or seven years' planting in a bearing condition, and just living the best it can under and in the shade of its more luxuriant neighbor, the peach. It takes more nerve than most fruit growers have to cut down a peach tree in full bearing to make room for anything else. I would plant the peach and apple tree separate."

Much has been said about the site or location for an orchard. I find advocates of every point of the compass, and each presenting an equally good claim to be equally valuable. I particularly noticed this season and failed to see any thing in tree or fruit that denoted the northern or the southern slope, the eastern or the western, to show that one was better than another. Hence I say that aspect, as a point of importance, exists only in theory or imagination. I deem it of much greater importance to have the land on which an orchard is planted in the highest state of fertility, such soil as will produce 100 bushels of corn per acre, or four feet of wood on an apple tree, producing in one year a tree equal in size to one of two year's growth on poorer soils. If the ground is not naturally rich, make it so artificially, and keep it in this contion." It is generally contended that an apple tree planted in rich soil will require longer to come into bearing, but my own observation and experience teach me that this is a fallacy.

PRUNING.

J. F. Gray would leave brancnes two feet from the ground.

Mr. Winslow thinks many orchards are injured by neglect of trimming.

J. F. Doud says the top of the tree should be started near the ground. Long trunks are likely to lean to the north and be injured by the sun.

Mr. Kesterson says: The fruit grower should have the form of the tree in mind, and prune to *that* when the tree is young. I never prune many small limbs, but cut off a whole limb close to it, one to one and a half inches from the trunk. I prune in winter for growth, and in summer for fruit. I often slit the back of young trees with a knife, from the limbs to the ground.

Mr. Burches says: Let the orchardist control the sap at the right time by pinching and pruning, directing its course as his intelligence may dictate, to all parts of the tree, keeping it in balance, the result of which will be early and equal maturity of the buds and young wood, and the danger of winter-killing averted. I am fully aware that the idea here set forth will not meet with much favor, for it is contrary to the usual teaching; but, nevertheless, it is correct.

W. J. Hesser: Some varieties need much pruning, but it is much the best to prune a little at a time, and often. We are making a grand mistake in training our spreading trees with short trunks. I think I have cut one-half the top of some of my trees, and yet they are too low.

PROTECTION.

Mr. Winslow says: I can see no difference between orchards which are protected and those which are not. Orchards on the open prairie are as thrifty and bear as well as those not. Maiden's Blush and Ben Davis are better, I think, or more perfect, on the open prairie than in cultivated land.

(The trees spoken of as on the uncultivated prairie were planted where the grass had been killed by piling mowed grass on the soil, and the trees planted there the next year.—COM.)

Mr. Kesterson would plant a good wind-break around the orchard the next year after planting the trees. The sycamore is a good tree for this; it retains its leaves so late and grows rapidly.

INJURIOUS INSECTS.

Mr. Burches: The insect that does the most damage is the codling moth (*carpocapsa pomonana*). To destroy this moth little or no effort has been made here. I would be glad to hear of some means being devised to avert this danger. With the apple tree borer we are not much troubled, except in isolated cases, and in neglected orchards.

Mr. A. S. Harmon: Our principal enemies are curculio, rabbits, and mice, especially the latter, where weeds are left around trees.

Mrs. Loveless: Since I began to pasture my hogs in the orchard I have had no trouble with insects or gophers. All rubbish should be cleared away from trees in the fall. Trees may be protected from rabbits in winter and sun-scald in summer, by having cornstalks tied around them.

Mr. Kesterson: I have had a severe battle with cherry lice and the curculio. My only success has been with carbolic acid thrown on the tree with a syringe till the fruit was four weeks set.

KINDS.

Mr. McKinney: Wine Sap is the most salable, but I prefer Rawles' Jenneting for winter.

Mr. J. W. Gray prefers Duchess, Maiden's Blush, Wine Sap, Rawles' Jenneting, Sweet Romanite, White Bellflower, and Limbertwig.

Mr. Burches: Varieties most profitable: Domine, Wine Sap, Ben Davis, Fulton, Vandiver, Jenneting, and Sweet Bough. Of this list, Domine stands first. Mr. Smith, of Brownville, the owner of ten acres of orchard, with some forty varieties in bearing, says if he had space to plant but one tree, that should be a Domine. Others are equally enthusiastic about other varieties. The Domine is a healthy tree, a strong grower, an early bearer, fruit less stung by codling moth than other kinds; the fruit grows in clusters; the stem being short, places the apple so close to the branch that it is not so liable to blow off. This year the Domine has, in several instances, borne fifteen bushels, on trees planted in 1868.

There is one other variety that deserves special mention: Early Pennock. Although not first-class in all the qualities requisite, it has large size, showy appearance, and brings $1 per bushel when other kinds sell for 65 cents.

I cannot close this report—Mr. Burches continues—without adding this remark in reference to a variety of winter apple, incorporated into the list of twelve varieties for a small orchard. I speak of the White winter Pearmain, as far as observation and experience teaches us, in this county. I have visited most of the orchards in this county, and find it occupying a place in each orchard. The tree seems to be particularly subject to the depredations of the apple tree borer; the fruit is covered with specks; and not a perfect specimen is to be found in our large collection at the State Fair. If such specimens as we had of that variety were fair samples, we think the tree unsuited to our soil, and should be discarded from the list.

Mr. Kesterson: Many more varieties may be profitably grown than we now have.

J. F. Doud: Were I to plant 1,000 apple trees, I would plant as follows: Ben Davis, 200; Wine Sap, 100; Jonathan, 100; Jenneting, 100; Willow Twig, 25; Wagner, 200; W. W. Pearmain, 25; Fameuse, 75; Maiden's Blush, 75; Early Harvest, 5; Red June, 95.

J. W. Shannon names as his favorites: Yellow Bellflower, Maiden's Blush, Red June, Fameuse, Willow Twig, Wine Sap, St. Lawrence, Limber Twig, Jonathan, Canada Red, Fall Wine, Northern Spy, and W. W. Pearmain.

Several others have given lists of preferred apples, but it would take too much space to reproduce them here.

PLUMS.

Mr. Burches: The plum crop suffers more from insects than any other fruit we raise. The curculio makes its raids annually, and no effort has been made to check its progress, except in one case: Ex-Governor Furnas had on his place a plum orchard of sixty or seventy trees, of several varieties, the fruit of which was perfect in every respect. This orchard was inclosed with rough boards, put up as pickets, about eight feet high, and was used as a poultry yard. The success is attributed to the chickens feeding on the larvæ of the curculio, as well as on the weevil itself. This fruit was sold for $4 per bushel, some trees yielding four or five bushels.

The plum is not, as a general thing, a success, but this is entirely owing to the depredations of the weevil. The wild goose and minor plums are not exempt more than other kinds.

GRAPES.

Mr. Burches: The improved varieties of grapes seem to be at home here. There is no mildew, and not much rot, except the Clinton and Taylor's Bullet, which I think was caused by the system of pruning practiced. I think the spur system erroneous in principle, and cannot fail to produce deleterious effects in practice.

PEARS.

Mr. Burches: Very few pears planted. What with the blight, and some carelessness, many have become discouraged. Out of hundreds that have been planted on the prairies, as early as 1863, there are but few living now. Yet there are quite a number of trees bearing abundantly, and are pictures of health. These, however, are planted on bluffs and highlands originally covered with timber. Such trees seem to be much freer from blight than those on prairies.

SEEDLING PEACHES.

All who looked through the display of peaches at the State Fair must have been struck with the remarkable number and size of new seedling peaches. It seems to your committee that this is a branch of fruit-growing of great promise.

In conclusion, it may be remarked that the presence of vast numbers of grasshopper eggs in the spring of 1877 tended to discourage the planting of orchards; yet, when they were planted, the year proved an excellent one. The early part of the season was wet, and young trees rooted well. Undoubtedly the very dry time in July and August would injure some where they were not heavily mulched; but wherever that was attended to as it ought to be, young fruit trees would make excellent growth.

HALL COUNTY.

BY J. E. NORTH.

I have been unable to get any very complete statistics in regard to the planting of forest trees in this county during the year 1877, but, from what information I have, and estimating on the aggregate, I thing you can safely count on twelve hundred acres planted in seeds and trees during the year. The number of trees will be about three and one-half millions. Hoping that another year I can give you more accurate information in regard to old Platte.

FOURTH JUDICIAL DISTRICT.

BY J. T. CLARKSON.

Your committee for the fourth judicial district would respectfully report: That while, for various reasons, the fruit-growing interest has not as yet met with the most gratifying results, yet enough has been accomplished to demonstrate, in the most flattering manner, the capacity of Nebraska for that most important branch of agricultural industry. The portion of the district lying north of the Platte river, particularly, has as yet produced no fully developed orchards of much size, the principal difficulty lying in the youth of the country. In some sections the farmers have exhibted laudable enterprise in buying and planting stock; but want of proper attention, the absence of wind-breaks, the inferiority of stock, and the injuries inflicted by the grasshopper and other enemies, all have helped, in many instances, to cause the ruin of many trees which have been planted, while, on the other hand, the many that remain bear witness, in their beautiful and healthful appearance, that they are being nurtured in a soil and climate most conducive to their growth; the main obstacle, however, arising from the inability of our farmers to purchase nursery stock to the extent they would otherwise do. While the country is as yet too much in its infancy to have accomplished any great results, yet on some of the oldest settled farms orchards of various sizes exhibit many as fine trees, productive of choice fruit, as may be found anywhere. In this we refer to farms opened up, upon the thoroughfares, years before the general settlement of the country.

It is the uniform testimony of parties who have given attention to these matters that the soil and climate of Nebraska are admirably adapted to the growth of the various fruits, more particularly apples, plums, and cherries, and peaches and pears to a very gratifying extent, white grapes, currants, strawberries, raspberries, and blackberries thrive in a manner that cannot be surpassed.

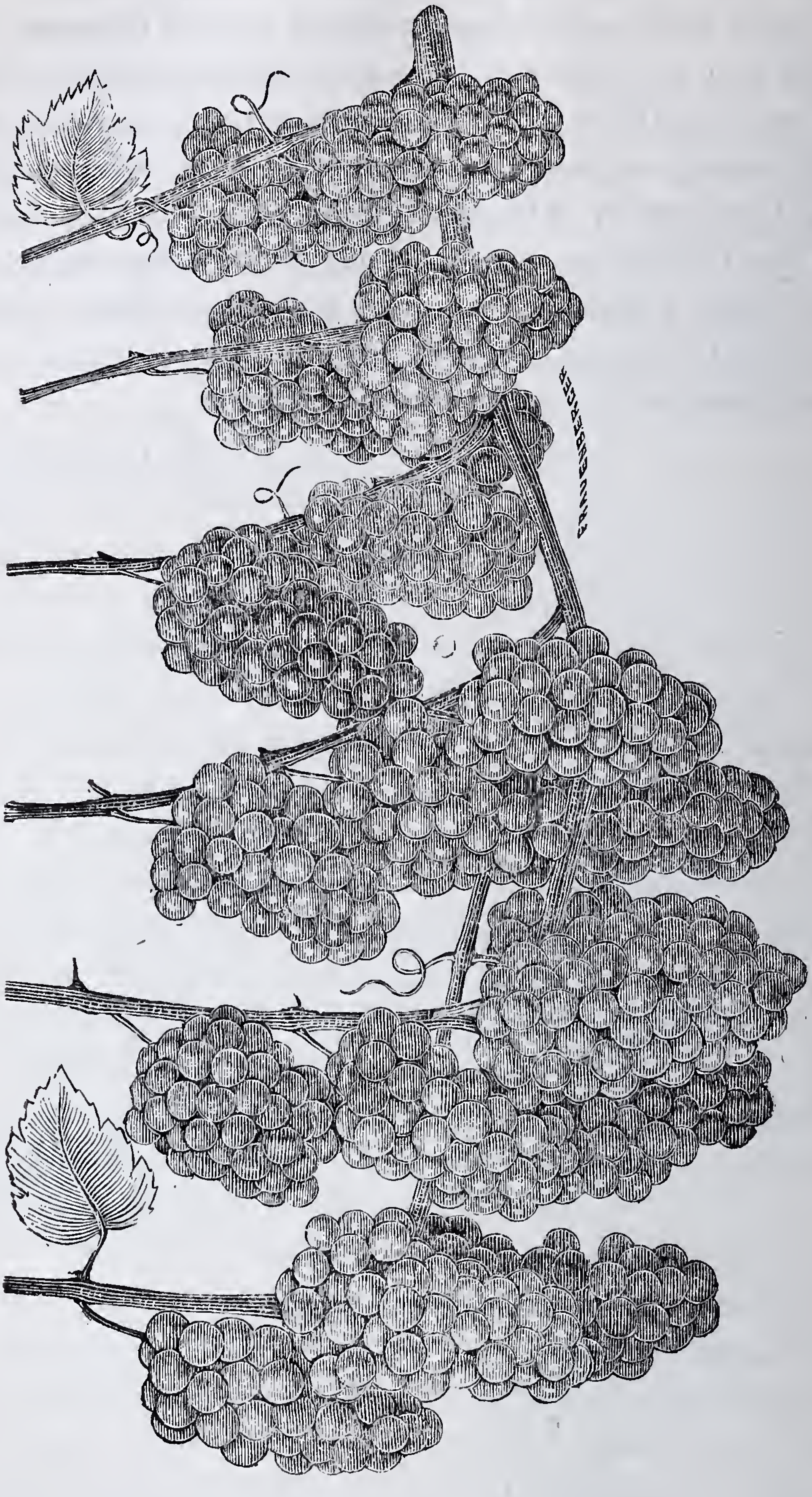
The people of Saunders county have made more progress in this important matter than any other portion of the district. Quite a number of orchards have been planted and well cared for; and, while they have not the requisite age as yet to make a great showing of fruit, yet the healthy condition of the wood gives indication of an abundant yield in the near future.

The city of Fremont also furnishes abundant evidence of what Nebraska will cheerfully do, if allowed, in the matter of fruit growing. Quite a number of gentlemen residing there have devoted considerable attention to the cultivation of the various fruits, and solid blocks of thrifty and beautiful trees and vines are proofs of what can and will be done throughout the State. The portion of the district lying west of the points last mentioned, have been subjected to more serious depredations of the grasshopper pest, which proved more or less destructive, by consuming the leaves of the young trees, late in the summer. Among the many orchards which were subjected to this demoralizing treatment, we mention the fine orchard of Wm. Koenig, of Hall county, in which out of 1,592 trees, but little more than 600 survived.

It has been thoroughly demonstrated that Nebraska will create as fine a tree in as short a time as any known portion of the globe, and her agriculturists are intelligent enough to know it, and enterprising enough to take due advantage of it, and with the return of material prosperity, which is now at hand, there is every indication that their attention will at once be directed earnestly to the culture of fruit, which will at once embellish their homes, bring health to their systems, and money to their persons, combining profit and pleasure in a most eminent degree.

J. T. CLARKSON,
Chairman.

A NEW WHITE GRAPE—THE PRENTISS.



Branch 20 inches long, weight 7 pounds. Photographed by G. W. Godfrey, Rochester, New York. Exhibited at meeting of the American Pomological Society, 1879.

Originated by J. W. Prentiss, of Pultney, Steuben county, N. Y., on Crooked Lake, near Hammondsport. It is a seedling of Isabella. Bunch large, not often shouldered, compact. Berry medium to large, yellowish green, sometimes with a rosy tint on side next to sun; skin thick but very firm. Flesh tender, sweet, melting, juicy, with a very pleasant and musky aroma; free from foxiness; little if any pulp; seeds few and small; very similar to Rebecca in quality, but vine a vigorous grower, and foliage very distinct from Rebecca. Foliage healthy, thick, resembling Diana or Isabella, showing its native origin. Vine a good grower, and very productive, inclined to overbear, and clusters should be thinned unless pruned close; vine hardy, and buds uninjured with thermometer 15 to 20° below zero. The grape is an excellent keeper, and was exhibited at the Western New York Horticultural Society, at Rochester, January 22, 1879, in perfect condition. Ripens about with Concord. The fruit has sold in New York markets for the past three years, wholesale, in quantities of 500 to 1,000 ℔s., at 18@25 cents per ℔, when Concords were selling at 5@6 cents, and Delaware's at 8@10 cents.

Specimens of this grape were exhibited at the January meeting of the Nebraska State Horticultural Society. No vines are yet for sale. They will be offered for delivery in the spring of 1881, by T. S. Hubbard, Fredonia, N. Y., who has exclusive control of this new grape. In season, two pound specimens of fruit will be sent by mail on application, with twenty-five cents to pay postage.

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APPENDIX.

THE MOUNTAIN FORESTS AND WATER SUPPLY OF THE CONTINENT.

BY DR. JOHN A. WARDER, OF OHIO, PRESIDENT OF THE AMERICAN FORESTRY ASSOCIATION.

The mountains were intended to be perpetually clothed with forest growths, at least to the *timber line*, at a varying elevation depending upon latitude, where arboreal vegetation is restricted by the low temperature that approaches the conditions of perpetual congelation.

The traveler, to be of any use to himself or to others, should keep his eyes open, and observe every phenomenon as he passes through the country.

Limited observations, when among the Rocky Mountains a few years since in Colorado, and more recently in a journey on the Medicine-Bow mountains of Wyoming Territory, have given the writer still firmer convictions of the truth of the first proposition, which had already been accepted, as truly set forth by forest writers of Europe, and read in the open book of nature, as it was unfolded before his eyes in the Alpine regions of that continent. But these journeys among the Cordilleras of our country, exposed as they are and have been to the ruthless and wanton destructiveness of ignorant and thoughtless man, have filled him with serious apprhensions respecting the future water supply of our western rivers.

The destruction of these mountain forests by fire is indeed a most fearful and melancholy subject to contemplate. An inspection of portions of the public domain by one who has studied the subject, and who has either read of or witnessed the disastrous effects of the spoliation of the forests in elevated mountain heights, cannot fail to fill the mind with the most serious apprehensions.

The efforts of the Secretary of the Interior on behalf of the forests are highly appreciated by those who have made a study of the influence of the woods upon the country's water supply. The mountains (up to a certain elevation, close to the limit of perpetual congelation) were designed for the forests, nor should they ever be stripped of their arboreal covering, for, as the Secretary has well said in his annual report of 1877, if the forests in such regions be once destroyed, they will never be restored. The rationale of the action of the forests as receivers, reservoirs, and fountains of waters, is perfectly simple and familiar to all students of forest science, and may be understood by any one of common powers of observation, who may have had his attention directed to the conditions of the earth's surface in a wood that is in a state of nature. The fallen trees and branches, the undergrowth, the mosses and other herbage, among the decaying leaves, the accumulations of years, all these, and the leafy canopy above break the force of the falling rains, which come quietly to the earth, and are there arrested, and instead of rushing tumultuously down to lower lands, they are absorbed as by a sponge, until, although gradually percolating into the soil, they reach internal cavities or porous strata, from which they are gradually distilled through perennial springs, that keep up a constant and regular supply for the streams and rivers.

But to return to Wyoming, to scenes so recently visited—while traversing a broad plateau of the range, and passing through a glorious forest primeval, the traveler closely scrutinized the trees. These were chiefly pines, and almost exclusively of our species, (*pinus contorta*) but among them, in the lower and damper spots, the most lovely firs and spruces reared their tall shafts, clothed with a mystic drapery of depending boughs, bearing the silvery green foliage of the *Menzies*, *Douglas*, and *Englemann's* spruces, nd of the *Grandis* firs.

While contemplating these noble trees, we suddenly came upon scene of *appalling desolation.* Upon a tract of many square miles n extent, as far as the eye could reach in every direction, over nany thousands of acres, there was not a living tree to be seen. ll, all, were standing bare, stark, and stiff in death; their tall dead trunks blackened by fire, except where time had kindly come to their relief and stripped off the bark, leaving the bare poles that stood by the way like shivering ghosts, waiting in purgatory until storms of years should prostate them to the earth that bore them, when they would at length gradually crumble into mold to renovate the soil, which had been deprived of all vegetable humus by the fierce flames of the conflagration.

The forest is destroyed, the noble trees are dead and gone, too often never in our time to return, to be a kindly covering and a befitting garniture to the sad wastes, and to clothe these mountain sides with verdure. *Continued* and *continuous* desolation is their sad doom.

Practically speaking, this is and must be so. Whence can come the seed germs for the future aforesting of such extensive tracts? Man, the improvident destructive, will not do it. The kindly winds can transport the winged seeds but a short distance from the parent trees. The cunning and provident rodents have a still more limited range within which to carry the seeds they may gather, and, with wise instinct store up for their hyemal repasts, from which a few might escape to germinate and form nuclei, producing at length seeds for further distribution in the future.

Ages must be required to restore these forests in the slow course of nature, and, meanwhile, the degrading agencies of every storm will be carrying away the soil, and scarring the mountain sides with frightful gullies and chasms, occupied at times with violent torrents, for there is no longer any herbage, no moss nor bush, nor any debris to cover the surface, and sponge-like to absorb and retain the precipitated moisture.

Yes, our worthy Secretary was perfectly right in his assertion that in these bared mountains, the forests would never be restored When thus ruthlessly destroyed. In certain situations and over such vast areas, practically speaking, in reference to any period of time that it is worth our while to calculate upon, any time that we or our progeny for many generations need take any account of this is sadly true.

PREVENTION.

But, it may be asked, cannot these terribly destructive fires be prevented? Cannot these calamitous results that must inevitably follow be avoided? Yes! yes! they may, and they *must* be prevented, and that at once, lest our fair continent become a desert, unfitted for the many millions it is capable of happily sustaining upon the broad territory of her beautiful bosom.

This is indeed a great question, and one requiring the exercise of a high order of statesmanship. It is truly a difficult question, but the interests at stake are enormous, and are of infinitely greater importance to this NATION than deciding who of all the great army of office-seekers shall be gratified by an appointment to this or that petty office under the government; and yet there are those who were sent to guard the great concerns of the state who cannot spare time from the scramble after offices to listen, to study, nor to advocate matters of such great import as this. Oh that we could be blessed with a race of *statesmen* something better than politicians, and capable of grasping and of solving such questions as this!

Yes! the interests at stake are truly enormous; they involve the welfare of the country since they concern the permanence and the very existence of our rivers. If their consideration be neglected will not some future explorer of the vast *Sahara*, that may extend eastward from the base of these mountains find, amid the shifting ands of that wide desert, only depressions of the surface to mark he ancient beds of our great rivers and their tributaries in that American Sahara, as Charnpallion has observed them in the wastes f northern Africa, of which he said: "And so the astonishing ruth dawns upon us that this desert may once have been a region f groves and fountains, and the abode of happy millions. Is here any crime against Nature which draws down a more terrible urse than that of stripping mother earth of her sylvan covering? The hand of *man* has produced this desert, and, I verily believe, very other desert upon the face of this earth. Earth was Eden nce, and our misery is the punishment of our sins against the world of plants. The burning sun of the desert is the angel with he flaming sword, who stands between us and Paradise."[1]

But how shall this great work, the preservation of the mounain forests, be accomplished? How shall we preserve these treasure-houses of the snow and rain that they shall steadily distil the streams which are to fill our rivers?

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[1] Quoted by Dr. Oswald, and from him by Eli K. Price, in Sylviculture, an essay read efore the American Philosophical Society, Philadelphia, 1877.

It may be effected by wise legislation after we have enlightened the public upon the subject of an advanced forest science and educated them up to a proper and just appreciation of the importance and of the especial functions of the forests on these mountain heights, as *consumers* of *moisture*, as *receivers*, and as *reservoirs* of the water supplies of a large portion of the continent.

When so educated and fully informed upon these important truths, with an enlightened public sentiment, the people will become more careful in the use of this dangerous agent; they will be more watchful of their camp-fires, they will compel others to be more careful, and they will stamp out the first beginning of a conflagration.

In addition to this enlightened public sentiment, and complimentary to it, legislation will be needed to operate on those who may wickedly or ignorantly transgress. Some of the excellent suggestions of Mr. Schurz were incorporated in the bill of Senator Plumb, of Kansas, last winter (S. 609). They might prove valuable as preventive measures, especially the appointment of fores guards, as proprosed in the 3d section. Section 13 is intended to prevent fires on the public domain, whether in prairie or timber Such a provision has never existed in the case of government lands though provided for by some of the states.

The losses by fires are enormous, and should be prevented.

Some of us know by sad and painful experience how difficult it is for the philanthropist, who presents a simple proposition for the public good, how greatsoever its importance, to arrest the attention of the public. We have also learned how almost impossible it is to reach the ear of the law-making powers, and to excite in their minds an active interest in such questions as are here presented in a word, how herculean an undertaking is presented, when we attempt to educate the people, and those who represent them in the halls of congress, up to a proper and full appreciation of such a subject as this of *Forestry*, which so deeply concerns the public weal.

More especially unpromising does such an effort appear, when an attempt is made to impress upon their minds the absolute necessity of keeping these extensive ranges of mountain heights in condition best adapted to attract and condense the atmospheric oisture, to receive the precipitation, to retain it for a time, and hen gradually and quietly to give it off through perennial prings, as limpid fluid, to supply the fertilizing streams that shall ill the rivers which are so happily and extensively distributed ver our great continent.

You who are engaged in forest studies, you who are planting rees, will unite in presenting our thanks to Secretary Schurz for he noble stand he has taken in defense of the forests on the public omain, and for the part he has taken to call the public attention the vast and wide-spreading influence exerted by them on the resent and future welfare of the country. Long may he be per- itted to prosecute these noble efforts in behalf of the protection, reservation, and extension of our woodland inheritage!

Mr. President, the above paper is but a repetition of an open tter addressed to the Secretary of the Interior, which may never ave fallen under the notice of any of your members. No apology ill be offered, however, for presenting it to men like yourselves, en thus at second-hand, because you are known to be interested, western tree-planters ever are and should be, in everything that lates to this great question of trees. Situated as you are on the eat open plains, this is to you especially a vital question, and is aspect of the infinite value to you of the mountain forests can- t be denied of interest, even in the imperfect manner of its pres- tation by such a tyro in forest science as your friend W.

HE RELATIONS OF GEOLOGY TO HORTICULTURE.

BY C. D. WILBER, M. A.

The relations of the earth to man were manifold. Attempts ve often been made to describe some of them, but the world can- t contain the books that might be written. The relations of ology to horticulture, to plants or trees, to vegetable growth, or in general to agriculture, are also multiplex, and we would not attempt even this theme but for the implied liberty of choosing some topic out of the vast range of inquiry. Coleridge in his "Aids to Reflection," points out these possible relations in a manner that indicates the path of new discovery. "The metal at its height of being seems a mute prophesy of the coming vegetation, into which it crystalizes. The blossom and flower seem impatient of that fixture, the flower-shaped butterfly that flutters in its free wing above it." In our essay, we shall briefly consider the geological history of soils, their mechanical composition, and the gradual progress from arid to arable lands, under the discipline of human industry.

I.

RELATIONS OF THE MINERAL AND VEGETABLE KINGDOMS.

We can divest a man of the various systems which make up his body, and at last reach that which most allies him to the earth. Suppose we denude him, first of his skin, then of his muscular system, next unbraid his nerves, then take off his veins and arteries; and finally, we reach the bony skeleton or system, which is nearly all made up of minerals, whose direct source is the earth. In like manner we can separate a plant into those portions that depend upon the atmosphere, and those that depend upon the earth for their supply of atoms or particles. There is, however, this difference, that in plants the systems of circulation, absorption, etc., are inseparable by any anatomy, while in man they can be separated, one by one, and held up to view, each independent and perfect. In the plant or tree they are so related as to admit practically of no separate analysis. But we can readily suppose that every tree contains a mineral tree whose crystals actually exist to the eye of science, which can trace its beautiful shape in certain though dim outline from the remotest root-fibre to the uppermost twig. It is this mineral system which connects it directly with the earth as its source of supplies, or mineral food, without which the tree proper cannot exist. This general fact being granted the relations between geology and tree-growth, and plant growth, or agriculture, can be better understood, though not readily explained, because we are as yet in the twilight of discovery in the department of vegetable growth.

CRYSTALS AND CELLS.

If we should pursue our analysis to its ultimate extent, we would find ourselves comparing the atomic crystals of the mineral kingdom with the microscopic cells of the vegetable kingdom. One has life—that is, its particle, or atoms, are being constantly transformed by the powers of life; the other has not this activity of life, but is dead, as we call it in our poverty of language. It can hardly be called inorganic, for the regular crystalline structure, endowed with polarity, is the next door to life or the prepared stage for its wonderful exhibition. It is conceded by mineralogists that all the rocky strata of the globe are merely aggregated crystals, which were brought into that state by chemical and mechanical processes. Those portions of rocky strata with which we are most familiar were certainly formed under such conditions as to receive the light and heat of the sun—we mean especially the wide range of stratified rocks, formed originally at the surface and upon the shores of oceans and seas. We may advance one step further, and say that the crystal character has never been lost, for the crystals are as perfect in our soils, under the microscope, as they were when they existed as a part of the original rocky mass. There-fore they possess their original qualities of actinism, polarity, and affinity, and are as ready and vigorous to perform their part in the problem of life as when first concreted. Hence every spring, under the influence of light, heat, and moisture, whether upon prairie or mountain, or in woods and valleys, we have the annual recurrence of what seems a new creation. The tremendous power of the forces employed during

THE GLACIAL EPOCH

were sufficient to break, crush, and distribute all the loose materials that now lie upon the solid rocky formations. In doing this work it brought together all the material of mountain, dyke, or mineral vein of stratified rock of slate, or limestone or clay, and ground them for ages, like a stamp mill in running water; but the machinery was so gigantic, so occupied with overcoming and reducing masses, that every minute particle preserves its original *vis vitae*. Geike, in his "Age of Ice," gives a vivid picture of glacial agency. "In alpine countries this wrecking of the mountains goes on chiefly by day and in summer time. During night and at early morn dead silence reigns among the snowy peaks; no streams are heard, no water trickles over the surface of the ice, but when the power of the sun begins to be felt, then the noise of water running, leaping, and falling grows upon the ear; soon the glaciers are washed by numberless little streams; great avalanches wreathed in snow-smoke rush downwards with a roar like thunder; masses of rock, wedged out by the frost of the previous night, are now loosened by the sun and dash headlong down the precipices, while long trains of debris hurry after them and are scattered far and wide in wild confusion along the flanks of the glaciers. . . . Glaciers, like rivers, are of all sizes; many have a depth of several hundred feet, and some in polar regions are probably not less than 3,000 or even 5,000 feet in thickness. It may be easily conceived that the pressure of such enormous masses of ice must have a prodigious effect. When a glacier advances beyond its usual limits everything goes down before it. Loose soils, debris, are pushed forward and the strongest and thickest trees are overborne just as if they were so many straws. But striking as these examples of the irresistible force of the glacier may be, the destructive and overwhelming power of ice, in motion, became still more noteworthy when the rocks over which the glacier passes are examined. Creeping in below the ice, which it is often possible to do, we find the rocks finely smoothed and polished, showing long striæ and ruts that run parallel to the course pursued by the glaciers. If we pick out some of these stones that are sure to be scattered about below the ice, we shall find that many are smoothed, polished, and striated in the same manner as the surface of the rock itself. All this is the work of the glacier."

ANALYSIS OF SOILS AND PLANTS.

We have assumed, without discussion, that all loose material, strewn everywhere over the earth are the direct results of the Great

Glacial System, which occupied a portion of the Cenozoic age. How perfectly these glacial forces performed their task of crushing, mingling, and distributing the materials that make up the aggregated beds of soils, *debris*, gravel, clay, loam, etc., which are everywhere heaped upon the surface rock of all countries—may be seen by examining any analysis of soil from any country, and comparing it with the constituents or mineral elements of plants. For instance, one of Prof. Aughey's analysis of Nebraska soils reads as follows:

Insoluble siliceous matter, 63.07; ferric oxide, 2.85; alumina; 8.41; lime carbonate, 7.08; lime phosphate, .90; magnesia carbonate, 1.41; potash, .50; soda, .49; sulph. acid, .79; organic matter, 14.00; loss, .50.

Arend gives the analysis of the ashes of 1,000 plants, when in fruit, as follows:

Silica, 3.632; sulph. acid, 5.34; phosporic acid, 14.00; oxide of iron, .58; lime, 14.71; magnesia, 6.45; chlorine, 5.78; soda, .87; potash, 43.76.

We can not study these two chemical correlations or counterparts without perceiving the immense

RANGE FOR EXPERIMENT AND DEVELOPMENT

that must exist in the powers of both soil and plants. Our farmers and our educators in agriculture and horticulture have this entire domain in their undisputed possession. We must study these relations each state by itself and compare the result year by year before we shall know the capacity or value of our soil in the products of the farm or garden. A few words from Emerson on "Perpetual Forces" will aid us in understanding the construction of soils. "Who are the farmer's servants? Who but geology, chemistry, the quarry of the air, the water of the cloud, the plough of the frost? Before he was born into the field the sun of ages soaked it with light and heat; mellowed his land, decomposed the rocks, covered it with vegetable film, then with forests and accumulated cubic acres of sphagnum whose decay makes the peat of his meadow. The rocks crack like glass by inequality of contraction in heat and cold, and flakes fall constantly into the soil. The tree can draw on the whole air; the whole earth on all the rolling main. The plant, the tree, is all suction-pipe, imbibing from the ground by its roots, from the air by its twigs with all its might. Take up a spade full of loam; who can guess what it holds? But a gardener knows that it is full of peaches, full of oranges, and he drops in a few seeds, by way of keys, to unlock and combine its virtues; lets it lie in the sun and rain, and by and by it has lifted into the air its full weight in golden fruit. What agencies of electricity, gravity, sight, affinity, combine to make every plant what it is, and in a manner so quiet that the presence of these tremendous powers is not ordinarily suspected. The ripe fruit is dropped without violence, but the lightning fell and the storm raged, and the strata were despoiled and uptorn and beat back, and chaos moved from beneath to create and flavor the fruit on your table.

II.

PLANTS—MOISTURE AND CLIMATE.

We have seen in Nebraska, and also in Kansas, during the last twenty years a decided

CHANGE OF SURFACE VEGETATION

or grasses. During that period many thousands of square miles, once covered with sparse buffalo grass, are now luxuriant with thick matted prairie grass. This change is so important in many respects that we invite particular attention to it. The chief agent or producing cause of this wonderful transformation of surface, is the gradual western progress of the army of farmers. Every step, year by year, is secured, and one step further taken by the advancing march of agriculture. In a word it is caused by the plow—more powerful in peace than the sword in war. This is the instrument which separates civilization from savagery; and, as we shall see in a larger sense than most are aware, it converts a desert into a farm or garden. In general, arid regions, deserts and dry plains, perpetuate themselves, and because they have attained an apparent permanence are considered eternal. A desert, however, is the result of conditions that can be controlled by the genius and industry of man. Let us see how it is done.

HOW DESERTS CAN BE CONTROLLED.

On our western border line of settlements the pioneer, with his plow, turns over the soil, or sod, if there is any, it may be 100 or 400 acres. This area is planted to corn or sown with wheat, oats, rye, or barley. In due time arises a living surface of dark green, which is at the same time a condensing surface, because it does not receive the heat of the sun during the day, while at night it is already cool, and permits a heavier dew to descend upon it. This pioneer farmer has neighbors on the north and south who are doing precisely the same kind of work—that is, by their farming they are changing the hot, dry surface to a cool, condensing surface. This work extends, by common consent, along a line of 1,800 miles, from the British Possessions to the Gulf of Mexico, until the new condensing surface is a strip, say ten miles in width by 1,800 miles in length, according to the wave of immigration for the year previous. It is easy to predict the

INEVITABLE CLIMATIC CHANGES

that must follow the changed condition of surface. The moisture contained in the atmosphere over this new-made surface of living green will not dissipate and pass away with the winds, as formerly, but will condense, by the well-known law, both as dew at night and into clouds, under the influence of electric currents. With the clouds comes precipitation, which will be greatly increased as the condensing surface increases by the constant efforts of the farmer to enlarge his domain of crops.

SPREAD OF IMPROVED GRASSES.

The prairie grasses are the first to receive the impetus indicated, and, accordingly, their westward march has been very rapid within the last twenty-five years. The width of new territory occupied by these grasses, displacing of course the dry or buffalo grass, is, in southern Nebraska, 150 miles in the space of twenty-five or thirty years, according to the statements of early settlers. This condensing or cool crop-surface, once established, becomes permanent, as in the eastern states, which are now under laws of precipitation that have but little variation from year to year. We know that this work has been wrought by the hand of the farmer from the middle of Minnesota, Iowa, and Missouri, and extends 400 to 500 miles west into Dakota, Nebraska, and Kansas. We know that it is still extending every year, and that in this year (1878) it will doubtless make a stride longer than ever toward the foot-hills of the Rocky mountains. The

AMOUNT OF RAIN-FALL

per year is steadily increasing west of the Missouri river. The average for nine years past at Omaha is twenty-nine inches. With the year ending June, 1877, it was thirty-eight inches in south-east Nebraska—an amount equal to the average of northern Illinois. From similar statistics we are able to show that the rainfall is steadly increasing westward, following the pioneer farmer and his plow, which is the primal cause of all these beneficent changes.

THE FUTURE.

With a logic that cannot rest we are forced to this conclusion, that the agencies of civilization now in action are such as will secure a complete victory over the wilderness and waste places of western territory. The plow will go forward; "God speed the plow," The rich carpet of grass will continue to advance. The rains will assume the regularity of times and seasons. By this wonderful provision, which is only man's mastery over nature, the clouds are dispensing copious rains upon millions of acres of surface that were for centuries comparatively parched and desolate. The

ABSENCE OR PRESENCE OF WATER

or moisture in the earth may be as important to its activity or ability to sustain vegetable growth as is the solution of salts in a liquid form to sustain or maintain electric action in our common galvanic battery. We can see, therefore, that the real quality or character of soils cannot be truthfully or practically determined without its ratio or proportion of water as a necessary ingredient; and no person can properly estimate the agricultural character of any country until he can examine it under its normal condition of evaporation and precipitation, which finally becomes established as the earth comes gradually but certainly under the control of the husbandman. In the book containing the earliest records we find these significant words, which embody in smallest compass the sum total of science upon this subject: "For the Lord God had not caused it to rain upon the earth (and there was not), because there was not a man to till the ground; but there went up a mist from the earth and watered the whole face of the ground." It went up a mist or evaporation, and came down as dew. But afterwards, in tilling the ground—that is, in substituting the artificial or condensing surface for the natural or arid surface by man's agency, the system of rains began, and will be perpetual as long as he makes and keeps his farm and garden.

RELATION OF INSECTS TO HORTICULTURE AND AGRICULTURE.

BY SAMUEL AUGHEY.

My special studies have been so largely devoted to Geology and Botany that I could not give Entomology that attention which the importance of the subject assigned to me demands. As there are not less than half a million of species of insects and probably at least three hundred thousand in the United States, a man must give such a science the undivided labors of a lifetime before he can grasp it even partially in its entirety. My own entomological studies, except in an empirical way, have been confined to a few orders of insects, and therefore what I have to say on this subject will be somewhat limited in scope.

THE INSECT FAMILIES.

One of the first things that arrests our attention is the amazing number of species and individuals among insects, as if nature, as Oken remarked, had done the filling in with insects: "Wherever there is a nook or corner left unoccupied by other forms of animal life, the vacancy is filled with insects." If we go out on our bluffs or bottoms on a cloudy June day, and select almost at random a square foot or yard of unbroken prairie, where no living thing but grass can be seen with the naked eye, and examine it closely with a microscope of sufficient power we will find the soil and grass to teem with life, and especially with minute animal life. As the season advances our eyes are regaled with myriads of forms, now marvelously beautiful and fitted to adorn the palaces of art, and again uncouth, repulsive and obnoxious to all the senses. Even polar regions, in their short, continuous, and almost tropical summer have such an amazing number of a few species of insects, that portions of Greenland, Iceland, and Arctic Siberia are at such seasons almost as little endurable as during their terrific winters. As we go towards the tropics the number of species increases, and their forms become more varied, and in some lands contend for possession with man himself.

There is a two-fold relationship under which this subject may be viewed. And, first, of insects as friends of man. I need not enlarge here on

THE HONEY BEE,

whose virtues and benefits to man have been commemorated in poetry and song from the earliest ages. Bee culture has been receiving increased attention, and deserves to receive still more. It has been unpopular in places because of the patent hive rage, which in a majority of cases was a patent humbug. But no pursuit pays better where it is scientifically and legitimately conducted. Millions of pounds of honey are elaborated by the plants each year that is not gathered, because there are not enough bees to gather it. Bees aid agriculture also in the help which they give towards the fertilization of flowers. The silkworm gives material for clothing that adorns beauty itself. The cochineal insect gives us our best scarlet die. Insects also furnish conspicuous materials for *materia medica.* Most of the

CARNIVOROUS INSECTS

are friendly to human interests. Look for example at the method by which we have been measurably freed from the depredations of the Colorado potato beetle (*Daryphora tenlineata*). It lays about 12,000 eggs during one season. If left undisturbed these will hatch out in about six days, and the larvæ will then feed on the plants from 17 to 20 days, and then descend into the ground, where they pass into the proper state in which they remain for ten or twelve days, and then appear as perfect beetles. In a week or less the sexes pair, and in six or seven days more the female again commences to lay eggs for another brood, thus going from one perfect beetle to another in from 48 to 55 days. A single pair can thus produce 1,728,000,000 in a single season. This is an enormous increase, far surpassing that of the locust. But here comes in the kindly works of predatory insects. At least four species of lady bugs and ten other beetles feed either on the eggs or mature form of the Colorado potato beetle. At least five plant bugs also feed on them, and the larvæ of a parasitic fly (*Tachina daryphora*) lives on its larvæ. Two beetles that also feed on the potato (*Epicata Pennsylvanica* and *Macrobasis fabricii*), likewise make meals of this beetle. Hence it has been that on the extrordinary increase of this enemy of the potato, in the course of years its insect enemies increased in the same proportion, until in some sections of the west it has been almost exterminated. These predatory insects have done more to make potato growing again possible than all the paris green on the continent. I need not remind you of the good services that predatory insects have done to lessen the number of locusts in many sections. A curious phenomenon sometimes presents itself in our wild plum groves. Eight years ago when the curculio was destroying many of the plum groves of

Dixon and Dakota counties, I occasionally found a section where the trees were but slightly affected. This for a time was a mystery. Finally I discovered that another insect was breeding in the larvæ of the curculios and destroying them. I afterwards found that this was the *Sigalphus curculiaris* that had come to the relief of groves. Prof. Riley has attempted to breed and propagate this insect, but with what success I have never learned.

RELATIONS OF INSECTS TO HORTICULTURE AND AGRICULTURE.

BY PROF. SAMUEL AUGHEY.

INSECT DESTROYERS.

Some almost entire families of insects are raptorial. Such are the *Nudirostri*, that have either a naked or free beak, wholly disengaged and without a duct. The spotted corsair (*Redivius vigutatus*), a member of this group, was sent to me during the last season from Blair, but I have not found any myself. It is said to feed on bedbugs like a near relative in Europe (*R. personatus*). To this same group belongs the nine-pronged wheel-bug (*Prionatus cristatus*), one of the most destructive of bugs to other insects. It was sent to me during the last season from Richardson county. The eggs are laid in hexagonal masses in almost every kind of situation. I have found them on limbs of trees, old rails, boards, and stables. From its birth this insect preys upon other insects, and a few of them placed near a caterpillar-infested tree soon cleans them out. The mature insect is of a gray color, and has a half-round ridge on top of its thorax, and this is covered with nine nicely arranged teeth-like eminences. They are disposed to insert their heads into the flesh and inject a poisonous fluid which produces more distress than the sting of a wasp, as I have learned by sad experience. There are at least a dozen more members of this family in the state that are predatory, and must be classed with the friends of the agriculturist. The *Tachinidæ*, one of the most beneficent

FAMILIES OF THE FLIES,

have greatly increased during the last few years. Their larvæ feed on the larvæ of vegetable-eating caterpillars, of moths, and on grasshoppers and locusts in every stage of their growth. They may in general be recognized by their stoutness and by being covered with bristles, and by the eyes in the males being much larger than those in the females. The thorax is short, as are also the legs. The abdomen is oval or cylindrical. The question is often asked me whether there is

ANY GENERAL RULE

that would enable any one to distinguish a predatory insect from an injurious one. I know of no such general rule for any order except the beetles (*Coleoptera*). As early as 1864 Prof. Thomas suggested that the beetles found under stones, planks, rails, or old timber, away from weeds or other vegetation would generally be found to consist of the carnivorous kinds. I have tested this matter to some extent, and have found that in nine cases out of ten it holds good. One of the most difficult and vexatious tasks of the entomologist is that of distinguishing the beneficent from the injurious species of insects. Among the four thousand species of beetles in Nebraska, there are at least a thousand that are either innocent or beneficial to agriculture, because of their known habit of feeding on the vegetable-eating insects. Concerning

THE ICHNEUMONS

here can hardly be any mistake made. Their wasp-like forms are o well known and their habits are so well understood that no decription is needed. They all feed in their larvæ state on either he larvæ, pupæ, or imago of other insects. When it is remembered that there are probably 2,000 species in America, their imortance to agricultural interests is seen to be very great.

INSECT HABITS.

Not the least of the benefits that come from some forms of insect life are the lessons of order, of government, and of industry, which they supply to us. This is specially true of the hymenoptera, to which the bee and the ant belong. The bees are a conspicuous model of industry and order. But in these particulars the ants are even superior to the bees. One species in Texas clears the ground for from five to ten feet around its city. After all the grass, weeds, and rubbish are removed the ground is planted with a peculiar kind of fine grass, on which it feeds. Its plantation is regularly laid out in plots and roads. And it tolerates no idlers in its community. An ant that won't work is killed. A gentleman of leisure is not known among them. These ant-communities have advanced a stage further than most human commonwealths. The ladies do the principal part of the work. Among some species of ants the males, after having gratified the cravings of the females, are killed. Some spiders, however, have advanced a stage further. Among them the female first kills and then eats her lover after she is through with him. It might be a question, however, whether this is progress backwards or forwards.

ORNITHOLOGY AND ITS RELATIONS TO HORTICULTURE.

BY PROF. H. CULBERTSON.

The relation of birds to the farmer, orchardist, and gardener has wisely claimed considerable attention from the thinking persons in these employments. And well it may, since it is, in many instances, owing to birds that we are enabled to raise either fruit or vegetables. They are nature's soldiers, to keep in subjection the great insect world. The influence which birds have upon the products of our country has received attention in almost every state in the Union. In many of them it has been a very important question, especially in the more thickly and longer settled ones. We read that at one time large portions of New England were devastated by the superabundance of insects. Laws were made prohibiting the killing of birds. Insectivorous birds were even imported to aid in the subjugation of the insects that were destroying the products of field, garden, and orchard.

MAGNITUDE OF LOSSES.

Notwithstanding the great destruction caused by insects, there are very few who seem to realize, in any degree, the amount of injury done, much less what noble friends we have in the feathered tribes. When we read of a cattle plague carrying off a few thousand head, or the hog cholera destroying hogs by the thousand, the people become immediately alarmed, and set vigorously to work to find a remedy. But these little insect pests work away, fast or slow, according to their number, and do an amount of injury that no epidemic has ever equaled. The annual loss from the depredations of insects in the United States is estimated by some at $400,000,000. In the state of Illinois the losses from the depredations of the chinch bug alone were $70,000,000 in a single season, only a few years since. And many of us know, by sad experience, what the grasshopper is capable of doing here, and yet we know but little about them compared to what they have been in some other countries. There are isolated cases where great injury has been done by one species of insects. But there are smaller numbers of many species of insects that are constantly at work all over the country that do their work slowly, but it tells largely on the grand aggregate of our products. It is against them that we must work to secure the products of our soil. We must employ the least expensive and most efficient means to accomplish their destruction. From the experience of the past birds seem to be the most efficient workers that we have for the accomplishment of this great work.

HISTORICAL INSTANCES.

Frederick the Great, king of Prussia, seeing the cherries, which he was so fond of, being taken by the sparrows, at once ordered a general warfare on them, and offered a reward of about fifteen cents a brace for all that were killed. Throughout Prussia the warfare was so vigorous against the sparrows that at the end of two years not only cherries were missing but almost all other fruits were destroyed—not by birds, however. They had been killed by caterpillars, and their leaves completely stripped, and their places taken by immense numbers of insects. The king saw his mistake and retracted his decree, and was obliged to import sparrows at great expense. It was a dear lesson, but well learned. At one time France tried the experiment of repealing the bird laws, on the ground that the birds had destroyed a considerable quantity of fruit. The law being repealed, the people, without any fear of law or land-holder, almost exterminated the birds. The result was soon manifest in the devastation of orchard, garden, and fields by the insects which were thus allowed to increase without their natural enemies to keep them in check. Buffon relates a case in point that occurred on the isle of Bourbon, where some locusts were accidentally introduced, and became quite destructive to crops. Birds were introduced, somewhat like our crow blackbirds, with good results. But the good they did was soon forgotten. The people saw them in the grain fields and supposed they were destroying the crops. The birds were accordingly killed. In a few years insects became so plenty that the crops were destroyed and they were obliged to import birds again for protection. But this time the people were wise enough to pass severe laws against the destruction of birds, and thus prevent a repetition of their destruction. The legislature of Connecticut at one time offered a bounty for bird-scalps, and three years afterward they had no fruit on account of insects. Another legislature repealed the act and offered a premium for the introduction of birds. Such instances might be multiplied, but these are sufficient for our purpose.

RAPID INCREASE OF INSECTS.

The importance of the bird question becomes more apparent when we know with what rapidity many insects increase when unchecked by their enemies. A few examples will illustrate. The queen bee, though not an injurious insect, lays in a season from 70,000 to 100,000 eggs—frequently 1,500 per day for a few weeks. The whole number that may be laid by one queen in her life time is from 300,000 to 500,000. One pair of grain-weevils have been known to produce 6,000 from April to August. The tent caterpillar that infests our apple trees produces from 300 to 400. To cap the climax of marvelous fecundity of insects we give that of the plant-louse. Under the most favorable circumstances one louse in six generations is capable of being the progenitor of 6,000,000,000, and when it is considered that there may be twenty generations in one season their fecundity passes into numbers far beyond our comprehension. Again, the importance of the subject is forcibly illustrated by the immense

NUMBER OF SPECIES OF INSECTS.

It is estimated that there are 300,000 in the United States. Some English authorities place the number in England at an average of six to each plant. Flint, of Massachusetts, estimates the number in that state as four kinds to each plant. Of the entire number of insects one-fourth are considered as cannibalistic, and destroy other insects; of the remainder a few are beneficial, but the larger part are injurious. In our state, according to Prof. Aughey's investigations, there are 150 species of insects that infest forest and cultivated trees. The apple, pear, and peach have about 100; the grapevine has 35 injurious insects.

II.

INSECTIVOROUS FOWLS AND THEIR HAUNTS.

Since we have so many species of insects, and some of them increase at such rapid rates, it may be asked why they do not become so numerous every year as to destroy everything. That matter seems to have been wisely arranged by the author of the universe. We have seen that one means of keeping the balance is by the number of insects that live on others—some by eating them entirely, some as parasites, and others by depositing eggs in or on the bodies of their fellows, and thus large numbers are destroyed. The birds, as we have seen, also aid to an extent that we do not appreciate. They are ever active in their work. They take but one at a time, it is true, but their aggregate work is often surprising. It is then a part of our duty to

INCREASE THIS ARMY OF THE FEATHERED TRIBE for the protection of ourselves and others. If we but examine nature, we may find some suggestions that will aid. Where man has not interfered there is generally such a balance preserved that we see but few of any kinds of insects. Man has in many places destroyed the natural breeding places of the birds. When forests are cleared away thousands of little snug building places are destroyed. A few trees may be left standing in a field, but they are the favorite resorts of many kinds that are enemies to those that are beneficial, and these are destroyed. Again storms have greater power in isolated trees and small groves, and thousands are destoyed by storms bending the trees and emptying the young birds out on the ground to perish. In prairie countries much is accomplished by planting groves to which they are attracted. The groves as they get older form excellent nesting-places, and such places will have birds, while the farm without its grove or orchard will have but few. We have often thought of the difference between a home on the prairie surrounded by a grove, and one that had none. In the one place, on every beautiful spring and summer morning, the birds are singing merrily, making the place pleasant to every one that has a spark of the love of nature in him; while in the other place with no trees it is as still as death, and to one coming from a place of birds it seems as though some one was dead. We well remember our first spring in Nebraska; no cheering song birds were heard to make the scene attractive—no sound but the mournful "toom" of the prairie chicken was heard.

For utility, however, our small groves do not answer the purpose desired for the birds. It is true they are attracted to them in considerable numbers, but for the reason already suggested the small grove does not furnish the proper place for building. The storms have so much effect upon them that the contents of the nests are very frequently destroyed, and the enemies to the useful birds more readily find the nests and destroy their contents. It becomes our duty to provide snug little places for them to rear their young in. Some birds admire a box on top of a pole or building; others will accept the box in a tree, and thus may we make provision so that some varieties will increase more than twice as fast as they do at present, and as the result we get more insects destroyed by them. We do not mean to say, however, that we can entirely free ourselves of insects by the aid of birds. They do much to keep many of the insects in subjection, but there are some insects which the most of birds will not destroy, and hence we are liable to an excess of such at times when circumstances are favorable to their development. There are some kinds of insects, too, that require the combined efforts of birds and the cannibal insects to keep them in subjection. For example take the wheat midge of our eastern states, which is a native of England. In this native place it is known to have three species of ichneumon-flies which prey upon it, and it never does much harm, because it has so many enemies that it cannot reach such numbers as to devastate whole fields of grain. Unfortunately for our eastern neighbors, the midge was imported to our shores without its natural and deadly enemies, and hence the reason of its being so destructive in the United States.

Civilization has by another method been the means of increasing the number of insects. We have provided the most favorable means of insect development, while in a large portion of our country we have destroyed the natural breeding-places of the birds. We have increased the facilities for insect development, by cultivating plants of the same kind close together, thus giving them their food more convenient for them than they formerly found it in nature's system of scattering and intermingling all kinds together.

This may be illustrated as follows: Suppose that we wish to feed 100 chickens, and it takes a peck of grain to satisfy them, when thrown on the ground; but suppose the peck of grain were scattered over 100 acres, and they were required to go over that area to get their food—we can readily see that many of them would soon perish of hunger. But this is the way we find the plants and their enemies related more or less in nature, and we have been the means of bringing their food nearer to them by cultivating in fields. This of course we cannot avoid, but it suggests to us more emphatically the necessity of increasing the number of birds and insect-enemies. The important question to many in connection with this subject is

WHAT BIRDS OUGHT WE TO ENCOURAGE ?

There are some that we entertain no doubts as to their utility in destroying insects; there are others that seem to do much injury themselves, and would seem to be not very useful. But there are many more useful ones than we might at first suppose. There are exceeding few of our Nebraska birds but are great insect-destroyers. Some of them, it is true, take some fruit for the services they render in keeping off insects; others take some grain; but they are not particular about taking the cultivated grain, and they frequently do as much good by taking the seeds of weeds much more than we might suppose. Even the purely gramnivorous birds do us much service in the destruction of great quantities of noxious weed seeds. For the destroying of insects we would begin our list of birds by taking the

DOMESTIC FOWLS.

Around the farm-buildings is a favorite place for insect development, and there we would keep our chickens. The number of grubs, bugs, etc., that a flock of chickens will consume in a season we think but few appreciate. Suppose the common number of 20 chickens are kept on the farm, and that they only consume 20 insects each per day for a season of 150 days. This would amount at the end of that time to over 72,000 actually consumed, to say nothing about the many thousands more that were thus prevented from breeding. These taken from a few acres about the house must do much to keep the insects in subjection about the buildings. Then, instead of begrudging them their few grains of corn per day we should gladly encourage them for consuming our insects. Turkeys—perhaps still more objectionable to some—we would have on our list. Allen, in his "New American Farm Book," makes the assertion that a young turkey will destroy its weight of grasshoppers every three days. They take a wide range, and the food of the young especially is largely of insects when they can get them.

PLUM GROWING.

BY D. W. KAUFFMAN.

Mr. President:—On approaching the subject of plum growing, I am not unmindful of the fact that I am at once met by all the difficulties that attend this branch of horticulture. But I am consoled and encouraged by the fact that numerous difficulties have been overcome in growing the various other fruits, and why should we despair in trying to grow plums. Just as we learn the nature of any particular fruit and their insect depredators, as well as the diseases of the trees, we learn how to be successful in growing the fruit to maturity.

Plums are as easily grown as apples, and the insects depredating upon the former are not more difficult to circumvent than those upon the latter. Plum trees grow and do well on almost all soils, and quite a number of varieties are sufficiently hardy in this latitude to be measurably successful.

The preparation of the ground and the art of planting the trees is in no ways different from that of setting an apple orchard, excepting that plum trees generally have vertical roots and should therefore be set some deeper than apple trees are usually set. The distance may vary from twelve to twenty feet, owing to the varieties. The cultivation should be rather sparing, as with even sparse culture they are apt to grow so rapidly and so late in the season that their wood is immature when winter sets in, that they are liable to to be damaged. After a few plowings in the early part of the season, the weeds should be kept down with a scythe rather than with a plow.

Plum trees are propagated on plum roots and also on peach roots. In my experience I would prefer them worked on plum roots, although some varieties do equally as well on the peach. The Wild Goose and Miner, or Henkly, when worked on the peach and then planted tolerably deep, will take root above the peach root, which in severe winters will succumb as the peach root is less hardy than the plum.

Plum trees need but little pruning except some varieties that grow upright, these may be headed in at midsummer which will induce them to throw out lateral limbs.

The varieties that I would recommend, judging entirely from my own experience, are Green Gage, Imperial Gage, Washington, Jefferson, Coe's Late Red, German Prune, Shropshire Damson, Lombard, Quackenboss, Peach Plum, Smith's Orleans, Blecker's Gage, Miner and Wild Rose, the last two belonging to the chickasaw family.

The green gage is of the highest excellence, bears moderately full crops every year, tree rather a slow but healthy grower, and should be found in every collection.

The Jefferson is the largest of the list, the tree is a rapid grower but only moderately productive, quality of fruit good.

The Shropshire Damson is immensely productive, but the quality of the fruit is only medium.

The Miner or Henkley is also very productive, but the fruit does not compare in quality nor in size with the other above named sorts.

The German prune is a favorite wherever known, is of medium size, fair quality, and very productive.

Coe's Late Red is one of the latest good plums and is valuable because it extends the plum season.

Smith's Orleans is immensely productive, of fair size and good quality.

This list might be extended, but, except for amateurs, it is the best I know.

There are some varieties of wild plums in this State that are worth cultivating. I found two on the farm of Mr. Oscar Lane, two miles east of the City of Lincoln. Mr. Lane procured the seeds from which those trees grew on the banks of Blue River in 1875, planted them, and now the trees are from six to nine inches in circumference and from six to ten feet high, making in the past summer a growth of limb from three to five feet. These trees bore considerable fruit last summer, and of excellent quality.

The one is a yellow plum, and the other a blush red, skin dotted or freckled, oblong, $\frac{3}{4}$ to an inch in length of somewhat better quality than the yellow. Mrs. Lane manufactured some of these plums into butter and jellies, which are almost equal to those made from the European sorts. I have no doubt but that these can be improved by culture, and we shall watch this plum orchard in the future with considerable interest.

Mr. Lane is entitled to commendations in thus becoming a pioneer in developing the capabilities of this variety of our native fruits.

To grow plums is as easy as to grow apples, but it is quite another matter to save them to maturity.

Every studious fruit grower who has given any material attention to plum growing has observed that the failure in realizing regular crops of fruit has not been on account of unproductiveness of the trees, as almost all the varieties, or nearly so, are hardy and productive, grow well, and fruit early.

When we once learn to circumvent a few species of depredating insects we shall doubtless make plum growing as profitable as that of any other fruit.

The most formidable difficulty we have to contend with is the curculio. The black knot is in isolated cases a damage to the trees, but by a free use of the knife it is easily got rid of. The rotting of the fruit on the trees is quite a serious matter, and as this is doubtless a fungus, a living animalculi, it will not so easily be gotten rid of. I can suggest no remedy. When the fruit is not one-third grown it begins to rot and fall, and this continues up to the time of ripening, when frequently little fruit is left for gathering. When the fruit hangs in clusters, or where two or more specimens are in contact with each other, they are more liable to rot than where the specimens are isolated, but the latter are by no means exempt, as it very frequently pervades the entire tree.

Picking off the affected fruit is sometimes an advantage, but even this is not always of any avail. Some varieties rot most when just in the process of ripening; one side of the fruit may be ripe and delicious while the other side is in a rapidly decaying condition. As no remedy is yet known except to vigilantly pick off the affected fruit, our best thing to do is to plant such varieties as are least affected with rot. We have none perhaps entirely free, yet a few rot so little as to be comparatively safe. These are the Wild Goose, Miner, and the Damson. But from my experience I would not abandon any of the finer and more delicious varieties on account of the rotting of the fruit.

But now we come to the Curculio, a greater enemy to our success in plum growing than all other difficulties combined. So many theories in regard to the character and habits of the Curculio have been advanced, and so many remedies proposed, which as a rule have all failed, that the plum grower has become well nigh discouraged.

The earth under the tree has been paved with brick, or been plastered with cement, to keep the insects from emerging from the ground where the advocates of this plan knew they had burrowed. Others have spaded the ground to the depth of a foot or more, burrying the insects, it was supposed, too deeply to ever be able to resurrect. But all these futile attempts were only a waste or labor and money.

To the lamented Dr. Hull, of Alton, Ill., must be credited the plan of catching the Curculio in a sheet, by jarring the trees, and this is perhaps yet the most tangible method of heading them off. But while this seems almost a remedy, it is only partially so.

Dr. Hull demonstrated the fact that the curculios fly horizontally and from long distances, during the warm part of the day, or when the thermometer is at 80° and upwards. Now to keep the trees clear of these insects by jarring, involves this difficulty: they only fly into the trees during the warm part of the day, and if the tree is then jarred the insect at once flies away and cannot be caught in a sheet. When the mercury is below 80° the curculio is too much chilled to be active, and is easily jarred down into a sheet and is destroyed. Therefore, in the heat of day this process is of no avail, and the insects have most of the day to commit their depredations upon the fruits and cannot be caught, but can each day do a large amount of damage.

Only in a very cool season could a crop of fruit be saved by this method.

No application to the trees, and all putterings under the trees have failed, and no cannibal insect has yet been discovered that preys upon the curculio.

During the summer of 1874 I had a fine prospect for a crop of plums, and I determined to put forth an earnest effort to get a crop of ripe fruit. After practicing the jarring process for some time, and although I caught numbers of curculio, I still found from day to day the unmistakable crescent marks of the little curculio, my attention was directed to a notice of a Mr. Windoes, who saved the plums on a tree by accidentally smoking by burning some coal tar. I at once procured some coal tar at the DesMoines gas house put a quart of it into a long handled pan, put fire to it, carried it among the trees, giving each tree a thorough smudging. I repeated this three times a week for six weeks and saved thirty bushels of plums from 45 trees.

All insects seem to have a fine discriminating taste, and as this coal tar smoke is very offensive to breathe, no insect will go into a tree where the stench of this smoke is at all perceptible. While smoking the trees it was amusing as well as gratifying to see all manner of insects leave the tree, some by flying, some hastening down the stem of the tree and others letting themselves hastily down by their webs. After I commenced smoking the trees I frequently tried the jarring process, but always failed to find any curculio.

My theory is that while this does not destroy any insects, the unpleasant smell keeps them out of the tree, and while the fruit escapes being damaged, the insects fail to perpetuate themselves for the want of a breeding place, and thus their numbers may be decreased.

I repeated this same process every year since and never lost any plums by the curculio. I am satisfied that this same process will keep all kinds of insects from all varieties of fruit trees. I smoked a few apple trees in passing through the plum orchard and the apples from these trees were free from codling moth while the apples on all other trees in the orchard were much damaged by this insect.

While I have practiced this coal tar smoking for four years with success, I do not wish to be understood that I pretend to have a hobby, but would confidently recommend others to give this a trial, not only on plum trees for curculio, but on other varieties of fruit trees and for all kinds of insects.

CULTIVATION OF THE GRAPE.

BY JAMES Y. CRAIG.

Mr. President and Gentlemen of the Nebraska State Horticultural Society:

In response to your President I have endeavored to write an article here on the cultivation of the Grape-vine. I don't propose in this article to offer you anything novel or new to the practical grape grower, my object being to give a plain, general statement of the cultivation and management of the grape vine, as I think it stands at the head of all our fruits in this country when properly cared for ; but it requires care, and, judging from the condition we find some vineyards kept in, not only in this state but in many others, and that now when our own country is young, and so many of our farmers planting, and will be planting for years to come, I hope that these few suggestions may be of use to some of our neighbors, and, if so, I will accomplish all I desire.

The grape-vine has been cultivated and esteemed as one of our best fruits as far back as we have any account of civilization; and it has followed civilization from one country to another, progressing with it, and yet the same varieties do not succeed in all countries, nor all parts of a country. There are many varieties that are considered the standard grape in some countries that we have not succeeded with here, and do not expect to succeed with them in this climate. Still we have some indigenous species in this country, which new varieties have originated from, which are in every way desirable, and some writers say they rival in point of flavor any foreign grapes. This I am not prepared to admit. If there is I have not had the pleasure of tasting them yet. Some people are drejudiced against anything foreign, and others will give an extortionate price for an article just because it is foreign; therefore the prices that such articles bring in market is no fair point to judge from. But I have had considerable experience in growing the foreign grape under many different circumstances, and I have had considerable experience with our American grapes—in the states of Maryland and Virginia—and I am fully convinced that we have a wide field for improvement in this particular fruit. I have heard many fruit growers say it is no use, we cannot have all the good qualities combined in one fruit, your fine-flavored varieties are too tender for our climate, etc. This I am ever ready to admit, but I would recommend the same modes of proceeding that were followed by our forefathers on their grapes, and that is to improve upon the varieties that we have, that are suitable to our climate. All of the celebrated European grapes of to-day have been improved until they do not resemble the parent stock in any shape, flavor, or form. J. C. Lowden supposes them all to have originated from one variety, which was a native of Persia, and they have enumerated in some of their catalogues of to-day over 300 varieties. And this justly celebrated Red or Black Hamburgh, which is in Britain to-day what the Concord is to us—the grape for the people—was raised from seed about one hundred and forty years ago by a gentleman of the name of Warners, of Rotherhithe, in England. The grape-vine is very sensitive to changes of soil, climate, and exposure, and the care and attention that are bestowed on them have a very marked influence on the plant, its fruits and general appearance. This accounts in a great measure for differences in opinion in regard to the value of certain varieties of grapes. And they will also change in character that they are sent out many times with another name as a candidate for public favor, and, in many instances, such changes have so improved certain varieties that they are duly entitled to another name. As soon as the fruit of any plant makes a change of this kind, if it is a change for the better, it is caused from some certain substance in the soil, or the difference in atmosphere. The change of climate has its effects upon the different forms of vegetation as well as on the animal creation, and very often more so. These are accidental changes, and, therefore, not to be expected. We must not sit down and wait for these accidental improvements; if we wish to improve the grape we must give it proper care, the same as we would with any other fruit, and save some of the very best fruit for seed. If there are many different varieties of grapes growing in the same vineyard the insects will aid you very materially in hybridizing, they carry the pollen of one variety to another. But when a hybrid is desired from any two particular varieties, you must use every precaution to keep the insects from them, and perform the operation with a camel hair brush just before they come in flower. Procure a fine piece of cloth, such as the ladies use for vails, make a bag sufficient to hold the bunch, and wide enough not to touch it, then, once a day, while the flowers are opening, take the brush and touch the open flowers very lightly, then brush the other variety in the same manner. Sufficient of the pollen will adhere to the brush to accomplish the desired object. Do this once a day while the flowers keep epening. When the flowers cease to open the bags may be removed, and leave them to ripen their fruit; but for seed, the fruit must be thoroughly ripe, and either separate the seeds from the pulp and put them in sand and place them in boxes in the cellar, or bury them in the open ground until spring. As soon as the ground is open in the spring prepare the ground and sow. To prepare the ground for a seed bed, dig it thoroughly to a depth of ten to fifteen inches, then stake off the size required. A bed four feet wide and as long as necessary will be found to be most convenient. Drive a stake at each corner, then spread over it about one inch of well decomposed manure and one inch of sand. Fork it to a depth of four inches, several times, untill well incorporated and all pulverized. Then draw out the drills about twelve inches apart and one inch deep. Drop the seeds in drills about three inches apart and water them thoroughly, and never allow the bed to get dry. This ought to be done as soon in the spring as the ground is open. As soon as the young plants show themselves they will require partial shade from the mid-day sun. Stake them up singly and encourage growth as much as possible by stirring the ground and watering until about midsummer when you must leave them to themselves. Freely mulch so as to ripen their wood as much as possible for winter. When thoroughly ripened and danger from severe freezing, cut them down within two eyes of the ground, and mulch to protect the roots, as they will not yet stand the severe winters. In mulching draw up sufficient soil to cover the vines, then use about six or eight inches of straw. Manure ought to be avoided as it is so much subjected to fungus in this climate. The following spring, as soon as the ground will work, dig up the vines, using great care to preserve the roots, and plant them in some piece of ground where it has been thoroughly cultivated and enriched to a depth of two feet or more. If to be cultivated by hand they may be planted two feet apart each way. Keep staked and trained to one cane until they fruit. Some may fruit the third year and others not until five or six years. Keep all that show any signs of improvement on the parent vines, whether it be for some particular flavor, size of fruit or time of ripening. If they have not all the good qualities you would wish, you have gained one point, and by crossing them again with the other variety that possesses the quality that your seedling seems to lack, and follow this cross. I am satisfied in time we will have a big improvement on our present grapes.

The varieties of grapes that stand highest in public favor at present, as I said before, the Concord takes the lead as the grape for the general people. This variety was raised by E. W. Bull, of Concord, Mass. I believe there is more of this variety of grapes planted at the present day than any other. All over the northern, middle, and western states this grape alone has placed Mr. Bull as a benefactor to his country. Now it has two grand qualities: First it is a very hardy, vigorous grower, and none more productive, and it is one of our handsomest grapes when well grown. This makes it a desirable variety for market. I have no doubt about its being the most profitable variety for market, and it is the only grape that seems to suit itself to surrounding conditions. It will grow and do well in many different kinds of soil and in different latitudes. Of course when it gets the proper soil and care that is most congenial to the grape, it will improve the fruit of this variety as well as of others. My next one on the list would be the Delaware. I am not acquainted with the origin of this variety, nevertheless I think this is the best flavored of our so-called native grapes. It is rather a shy grower in the young state, but when the roots get well established it is a hardy, free grower.

The Catawba bears a high reputation as a wine grape. It was introduced about fifty years ago from the District of Columbia. It has always had one fault—it is a shy bearer, otherwise it would be the standard wine grape of to-day. But I am of the opinion that it ripens its fruits, probably, rather late for our falls in this state.

Hartford Prolific. This grape is growing in public favor—very considerably as a market variety. It is remarkably hardy and very productive. It is one of our earliest grapes, ripening about the beginning of September. This variety, I believe, in our rich prairie soil will require considerable summer pruning or pushing back; it is a very rampant grower, and unless checked, will give its attention more to wood making than fruiting. It has a very large handsome bunch, round berry and almost black.

Isabella is in public favor; something like the Concord, a regular old stand-by, that is for early crops, but I am a little doubtful of its standing our dry summers here; if it will it will be found a desirable market variety.

Martha.—This is a seedling of the Concord, of pale yellow color, of very good quality, strong, healthy grower and very productive. I think it a very desirable variety for market.

Rogers' Hybrids.—These in some sections of the country seem to do well, and where they will succeed I think some of them a great acquisition to our yet limited catalogue of grapes. I have grown Nos. 15, 19, and 32 in Maryland and think them the best grapes I have seen in the United States. I had my doubts of their hardiness in this State, but I see in the *Center Union Agriculture* of Dec. 25, a verbatim report of a meeting of the Western Iowa Horticultural Society, where Mr. H. F. Breming read an article on the grape vine, and he recommends No. 19, 32, 43, and 44 as the best varieties of Rogers' Seedlings. The latter varieties I am not acquainted with, but if they are recommended by a practical horticulturist in western Iowa, I should judge them to be suitable for this State and climate. But I think the grapes which were exhibited at our last State fair would be the best guide to refer to for varieties suitable for this climate. I see the Delaware, Concord, Diana, Martha, Hartford, and Clinton on this list, and in a class where profit was to be the standard we have Concord, Warden, and Martha; and in another class where table quality was the standard we have Warden, Delaware, and Cottage. These grapes were exhibited by Mr. H. Craig, of Washington county.

We have some very reliable nurserymen in this State where plants of any of the leading varieties can be procured much cheaper than you can raise them, and being already acclimated to our soil and climate, and the high reputation that these gentlemen bear, is sufficient guarantee that you will invariably get the varieties you order, which is not the case when you purchase from tree pedlers of imported trees.

Now a few words on the cultivation and requirements of the grape vine. I think that our soil in this State is admirably adapted to the cultivation of the grape, probably more so than any other fruit that we have. True, at our last State fair, held in Lincoln the fourth week in September, we had on exhibition the finest specimens of apples, pears, plums, peaches, and other fruits that I ever saw, still I think the grapes exhibited by Mr. H. Craig, of Washington county, were beyond anything I have seen in the grape, and proves conclusively that the grape is a success in this State when properly cared for, and here in this State we have very little outlay in money to give them all they require. First, our soil is already better prepared than most eastern vineyards are after there have been thousands of dollars spent on fertilizers, but I should recommend pulverizing the soil thoroughly to a depth of two feet or more, not so much to encourage roots that depth as to regulate the moisture. This ought to be done in the fall of the year and as soon as the ground is open in the spring. Stake off the ground seven feet apart, and by taking the plow and throwing a furrow out on each side the operator will find there is very little to do with the spade, then stretch a line in the center to plant by. It is necessary to have them straight in the row as they will then come to their proper place at the trellis. Many people plant six feet apart in the row but I prefer ten, this is only allowing the vine to run five feet each way from the stem, and will be found close enough for all practical purposes, and after the fourth year they will give better results then if planted closer. The trellis or means of supporting the vine is one of the most important points; they are sometimes tied to stakes just drove in the ground, and that is better than nothing. I would rather have five plants with a proper trellis than five hundred without any. The mode I have seen in most general use is, a row of strong posts put in rom 15 to 20 feet apart and four or five wires strained at equal listance apart, commencing one foot from the ground and one foot between each wire; five or six feet, it seems to me, would be about he proper height in this climate. In a treatise on the grape ine, by A. S. Fuller, I see a trellis described which I think a great mprovement on anything we had before. He places his posts eight or ten feet apart, according to the distance he plants his vines apart (he places a post between every two plants), nails on two horizontal bars or strips, one twelve inches from the ground, and the other within six inches of the top of the stakes; then strain the wire perpendicularly, twisting it around the bottom bar and also around the top, about twelve inches apart. You will find it will be more convenient and not any more expensive than any other trellis, as a much lighter wire may be used, but in all cases I would recommend using galvanized wire; it is the cheapest in the end.

There are many different opinions in regard to the cultivation of the grape, but I think that subject need not take up your valuable time here. I look upon the grape as a very gross feeder and requiring a rich soil to start with, and manure it liberally every year, if you expect the best results. There is nothing better for this purpose than well decomposed stable manure, but from the cow stable preferable. Bones dissolved or otherwise are good. Any animals that die from disease, etc., may be made good use of in the grape border.

Cultivate and encourage growth the early part of the season as much as possible to promote the maturing of wood and fruits as early as possible. Cultivation after midsummer further than to keep clear of weeds is not necessary.

Pruning the grape vine. There are also many different modes of pruning, and many people think there is something very mysterious about this operation to get them to fruit well, but if any person will study the nature of the plant, there is nothing more simple. The main object of growing the grape-vine is for its fruits, and it bears the fruit on the young wood, therefore in training the vine, wherever the plant is growing we want sufficient canes to fill up that space, keeping them two feet apart. These main canes ought to be extended at the rate of two feet or so every year, that is they ought to be cut down after the first year's growth to a little above where they are required to branch, then every winter cut back, leaving two feet of young wood on the main canes.

This will cause the side or fruit bearing shoot to start from every available eye all along the main stem; these are our fruiting branches, they will show fruit at two or more joints. I think one branch sufficient for each of these shoots. When they have formed the fourth or fifth leaf, pinch the tops off each of these shoots and also the main stem when it has made from three to four feet of young wood. This checks the sap from wood making, and turns its attention to the fruit, and at intervals of two weeks run over and check canes which seem to be monopolizing too much of the sap, but at each time let them extend one or more eyes longer than before, so as to leave one or more eyes to start always on the points. It is necessary to keep the eyes on the first portion of the branches dormant, this is your main reliance for the following reason: in this way we can have the grape-vine work just as we want it. In the fall or winter, when the wood is thoroughly ripe, prune back the vines ready for another year; the main stem cut back leaving two feet of young wood; the side branch that has been leafing, cut back to one or two eyes of the main stem, always leaving one plump head for to start the fruiting branch of next season, etc.

Grape vines will always make an effort to grow strongest at the roots of the branches. This can be regulated by training the main branches horizontally or by bending the points a little lower than the portion that shows signs of weakness.

When the main canes get old and begin to fail in vigor, bend the main branches down as far as possible to encourage young shoots to break through from the main stem or root. Select one and train along on the main branch in purpose to take its place. At the end of one year's growth this youug cane will be ready to take the place of the old one, which may be sawed off in this way. By cutting back one or two canes every alternate year, the vine can be kept young and vigorous for an incredible length of time. The celebrated Black Hamburg, at Hampton Court, in England, is now about one hundred and forty years of age, and yet in perfect good health, and bearing from two to three thousand pounds of fruit every year.

I do not believe in the removal system that some of our writers advocate, that is removal of the roots by making fresh plantations every 8 or 10 years either by plants or layers; there is no object in it, if the vineyard is properly cared for, it will last our lifetime and that of our families.

I have now occupied so much of your valuable time that I will ust notice the fruit, a little. The main object that we try for all the time is the fruit, and through all the care and time spent it is quite right to be impatient. Now grapes are too often gathered before they are ripe. Some of the reasons are that we may get the early market, and in many cases the grower does not know when they are ripe. They usually look to the unpracticed eye ripe from two to three weeks before they are really fit to eat.

I may here state that the grape is very different from many other fruits in this respect—it has got to ripen on the trees, or not at all. This accounts for many of the sour and insipid fruits we see exposed for sale in our markets, and our main objection is they will not keep well if they are not thoroughly matured on the vine; the stem of the bunch ought to have a dry, brown appearance before they are cut.

The keeping of the grape is quite an important item. I see no reason why the grape cannot be had on our tables for four or five months in the year. If they are thoroughly ripe they can be picked when dry and packed in boxes that will hold from ten to fifteen pounds, just using a little paper between each layer. Be careful not to bruise any of the fruit in handling, in fact, the less handling they receive the better. Nail the boxes up and place them in a cool cellar. If the thermometer can be kept at or near 40 degrees, the fruit will require but little care or packing, but if warm and moist we will have to use more care in packing, and I don't know of any material that is better for this purpose than clean wheat chaff, sufficient to fill up all vacancies. Look over once in two weeks, and with a pair of scissors cut out any that show any signs of decay.

One other mode of preserving the grape, and one that I think is destined at no very distant day to become very popular, is to dry them. The grape ripens so late in the season that drying by the sun is out of the question as a success, but to remedy this, here Young America comes forward with a machine for drying fruits, which, as far as I can learn, is a perfect success. There are enormous quantities of dried grapes imported to this country every year. I hope by this method we can supply this demand at home. This machine is named the American Fruit Drier, and our horticultural friend, ex Gov. Furnas, of Brownville, Neb., is general western agent. He had it on exhibition at our late State Fair in

Lincoln, and also specimens of the fruits dried, that I venture to say will please the most fastidious.

As we are quite a temperance community here, I will not discuss the wine properties of the grape, but thanking this community very kindly for the attention you have given me, and hoping that very many of you will have the pleasure of picking the fruit from your own vines before long, in this state, and that you will be rewarded with better grapes than any of our eastern states, in the near future, is a thing that is settled in my own mind.

FORESTRY.

BY J. T. ALLAN.

I think it is Horace Smith who says: "Your voiceless lips, O! flowers are living preachers—each cup a pulpit and each leaf a book."

The honored and memorable President of the American Pomological Society says: "Our trees, from the opening bud to the golden harvest, from the laying aside of their rich autumnal livery and during their rest in winter's shroud, waiting a resurrection to a new and superior life, are eloquent preachers to the inmost soul!"

In a previous address to this society I said: "The grand panorama of the world opens and closes with a vision of Paradise—opens with a delightful view of a garden glorious in its perfection of fruits and flowers, fashioned by a divine architect; closes with all that is allowed to mortals—a glimpse of eternal beauties, to which the human soul is invited by visions of beautiful trees and fruits."

And with these quotations we come before this society again, with a few words about horticulture, and what beauties, benefits, and influences are realized from planting trees, both for ornament about the dwelling, profit in the forest, and benefit in the orchard.

It becomes us to consider how we can promote the cultivation of trees in this state—and I mean both fruit and forest—and how to make that cultivation subserve the interests of horticulture; in what manner and how widely we can fulfill these duties, and diffuse useful knowledge on the subject. By the influences of tree culture upon climate, soil, and water supply, we may expect and are assured of an increased supply of food for man and beast, and thereby multiply the population of the world at the same time, with increased comforts and happiness. Our duty is mapped out. We and our successors should see the field before us and be stimulated by the grandeur and beneficence of the prospect, the cause of aridity, and to repair in time the mischief caused by man's improvidence. We have here in Nebraska our bad lands in the northern part of the state, and our treeless but not grassless plains on the west, but a few years of tree planting will more than double the growth of the native grasses, and the capacity of maintaining herds of cattle in the same ratio. With irrigation, which I claim can be accomplished, there can be a great wheat-growing region opened on the barren plains, as they are called. It would pay to irrigate for timber growing, and I wish this society could send a delegate to the Irrigating Convention, to be held in Denver this winter. After seeing the increased crops in Colorado, I am satisfied that where it is possible it will pay in Nebraska, both for grains, grass, and particularly for fruit.

If the rocky lands of New England will pay for planting, how much more will these rich prairies. The Massachusetts Horticultural Society, in 1877, offered the following prizes: Three premiums of $1,000, $600 and $400, for three tracts of larch and pines, of five acres each, four feet apart each way. Also two prizes of $600 and $400 for first and second best five acres of white ash, prizes to be paid in 1887. The above shows the estimate placed on this valuable tree which is a native of our state, and can be so easily grown from seeds which only cost the gathering. I look upon the green ash, which is more abundant than the white ash, equal in quality for manufacturing purposes. Mr. Sargent, the most prominent man in New England in forestry, speaking of the ash, says, considering its market value in all ages, and the length of time it continues to throw up suckers, the white ash is the most valuable of our native trees. Already there is a rapidly increasing export of ash lumber to Europe, Australia, and the Pacific coast from Boston and New York, and the possibilities of this business can only be limited by the supply. If, as he says, New England could command the markets of the world for this valuable timber, how much more could be done on rich prairie land in producing it. In an essay published in 1872, I placed the ash first in the list of hard woods. in which opinion I am sustained by the foregoing. The inquiry now often comes up from those who have planted groves and wind-breaks of cottonwood, what is the next best tree to plant. They have so far found success. profit, comfort and beauty by planting even a common poplar, and now feel like reaching out for something better, more durable, and, like the grand elms, more beautiful. All this advance will yet lead to the introduction of fine foreign varieties, but at present we advise to make the best use of the grand varieties which we find to the manor born. There can be no doubt of their improvement when planted in prepared ground. Their value for either ornamental or manufacturing purposes is well known.

Through the kindness of Prof. Aughey, we append a list of trees which he will publish on his forthcoming work on Nebraska. The botanical part will be of great interest to every one interested in plants and trees. He has found some species that were not supposed to be natives of the state, valuable trees to the future forestry of this region. The resident of twenty years, or the new-comer from the eastern states, will alike value the information.

He has, from personal observation, found the following growing in the state (we omit the botanical names):

Ash. White, Red, Green, Blue, and Black.

Oak. Burr oaks of two varieties, Post Oak, White Oak; Yellow Chestnut Oak of three varieties, Black Jack, Red Oak, Scarlet-Fever Oak of two varieties, Swamp or Pine Oak.

Walnut. Both Black and Butternut.

Hickory. Shell Bark, White Heart, Piqueet, Butternut.

Elm. Wahoo Elm, Red Elm, White Elm, and Cork-white Elm.

Cherry. Wild Red, Wild Black, Choke Cherry.

Willow. Black, Shining, Long, Silver-leaved, Long-headed, Glaucous.

Poplars. American Aspen, Cottonwood, Angled Cottonwood, Balsam poplar of two varieties.

Pines. Western Yellow Pine and Flexilis, White and Red Cedar, Douglas and Engleman's Spruce, Basswood of two varieties, Buckeye of two varieties.

Maples. Sugar, Silver, Red and Ash-leaved. Honey and Water Locust.

Thorn, two varieties.

Coffee tree, Hackberry, Mulberry, two varieties, Buttonwood, Birch of two varieties, Black Thorn—making in all 61 varieties of trees. And following them the smaller varieties, which may be classed as shrubs, like the Papaw Sumach of three varieties, Hop tree, Buckthorn, Barberry, St. John's Wort of three varieties, etc. So we see that we have a large and varied collection of our native trees worthy of our attention, and of great value for cultivation. We must refer particularly to the cultivation of the oaks. They have been considered of slow growth, but the present season we have seen specimens of Burr Oak five feet high from acorns planted only one year ago. Those who are thinning their groves of Cottonwood cannot do better than plant acorns, walnut, hickories, and chestnuts.

Adjoining Nebraska City, on the Bluffs, are two varieties of the Chestnut Oak, a strong growing and valuable timber tree.

But as we were going to remark, the forester should look to the condition of the soil, aspect, and elevation.

In every case we greatly need information, especially what and where to plant, as this is for future results, and to be followed up by those who succeed us. We want the broken and hilly lands planted with larch and the *Pinus Ponderosa* of the Black Hills. Abrupt hill sides and the winding of rivers and creeks afford an abundant opportunity for groves and coppice. Sandy lands, useless for grain growing, may afford a rich return of pine. Where portable mills find abundant work the drifting sands will be stayed and crops flourish.

In compiling the Horticultural Report, which we may possibly be able to issue this year, the subject of timber and hedge plantings should certainly receive the attention it deserves.

Successful planting thus far enables us to recommend the best varieties and most approved modes of planting. The planter of to-day and in the future can have the benefit of the past experiience in fruit and forest growing, if we can only publish our reports, for it is a fact that hundreds to-day are eagerly looking for the information which our growers possess.

If farmers would generally plant one side of the highways, and a row or belt of sheltering trees on the north side of their farms, and they and the Government should see that all untillable grounds should be kept in the growth of timber as far as practicable, exempt from plunder and fires, we shonld attain' that proportion of trees over the whole country which is required by the best interests of agriculture and the general good of the people. This should be the aim of all.

When we consider that trees requrire the growth of many years; that large tracts of country are denuded, which can be more profitably used by reforesting than otherwise, and that to make the reforesting useful and profitable, there must be choice of trees, and skill in the manner of their management and care, we must see that no time should be lost. This generation should begin the work effectively, and enjoin the duty upon those who follow.

As a specimen of the work we must notice Landreth & Co., of Philadelphia, who have already planted three hundred acres of walnut and will soon complete the planting of a thousand acres of hard wood and nut-bearing trees—chestnut and hickory—with acres of white pine. All these are on cheap and so-called worn out lands, but they have been far-seeing to plant near navigable waters and where cheap transportation can be had. They consider the profit assured. Think of the white pine forests which could be grown on the sandy regions on both sides of the Platte.

Eastern states which were dense forests are awake to the prospect of a timber famine. Ohio has cut off 4,500,000 of acres in the past seven years, leaving only about 5,000,000 as the entire timber supply of the state. This is only one instance in which the people are calling for laws regulating forestry and state foresters who can tell how and what to plant, what to preserve and what to destroy. The alarm in the eastern states should make us on these prairies more diligent in planting largely of the valuable trees for future manufacturing purposes.

The great depth of our soil and the loess formation so admirably adapted, particularly for the growth of all the nut-bearing varieties, gives this region great advantages. The proposition of forest planting invokes physical causes for physical effects. The work of itself is one of interest to the mind of the planter who looks with gratified emotions in view of the beneficent results which will follow. Man must obey the command, "replenish the earth and subdue it;" and obedient to this is the promise, "I will give you rain in due season; the land shall yield her increase and the trees of the field shall yield their fruit."

In large European plantations the seeds of trees, and principally conifers, are sown broadcast with crops of rye and other grain, which shelter the young plants from the hot sun and still are not injured during the harvest. Looking at the growth of the country and the increased demand for pine timber, and when we consider the time required to grow a pine tree to manufacturing size, we must earnestly urge the growth of the conifers, which can be had from the large growers like Douglas at very low rates. For forest growing the white pine, Scotch pine, and Douglas spruce will be found the leading varieties. European planters are planting largely of the latter, which grows to a height of 150 feet near the western borders of our state. Let no one doubt as to the results. We know success is sure with the deciduous, and the same can be realized with the conifers.

Let all these experiments go on—they must be tried, since in many respects we have new conditions as well as new men to make the observations, and new species to deal with—but meanwhile we should not be too proud to learn from others who were once similarly situated, and who have for generations been pursuing similar investigations, from which they have evolved and are still evolving the most important results, both in the principles and in the practices of the art, so that they may fairly claim to have established a *systematic forestry.*

When Dr. Warder returned from a trip to Laramie Plains last September he said: "Your people should once see the rugged hills of Europe planted with trees, and they would have forests in every direction on the hills and plains of Nebraska and Wyoming. It can be done. Plant along the water courses, and a current of moist air will follow in the valleys and aid the growth on the adjacent hill-sides. Go up on your mountain ranges and find what native trees flourish there, and transplant them to your western border. Depend much on what you have within your reach, exercising that diligence which is well ascribed to the western settler."

In reference to shelter belts, why not plant evergreens instead of deciduous trees? They present more leaf surface, therefore giving off more moisture, and are a protection from the cold winds of winter and hot air of summer. The beautiful hedge of the valuable red cedar around the university grounds shows by the skilled work of Mr. Craig what can be done at small expense. All who live within reach of the Platte or the Blue rivers can avail themselves of the positive advantages of this hardy native for shelter and ornamentation. Dr. Warder says this is a cosmopolitan extending from Canada to the Gulf of Mexico, and forming the connecting link between the sylva of the eastern states and that of the Rocky mountains, bridging over the treeless region. It is a thorough pioneer among evergreens, as the cottonwood is among the deciduous, and may be called the poor man's evergreen, for all may possess it who will plant around their dwellings and farms.

We again call the attention of this society to the necessity of aid from the state. I receive daily letters from different parts of the state asking information—what, how, and when to plant, where forest seedlings can be had, and so on. All these are answered at my own expense. But how much better if a plain pamphlet could be sent with the information desired, giving the experience of our older planters who have given years of labor and study to tree-planting, and thereby the mistakes of the past may be avoided.

Last September I had an inquiry from a farmer in one of the new counties, saying: "Where can I get 500 M (half a million) of one-year cottonwoods?" I think at the same time cuttings would have been as useful and at less cost.

Under the present needs of forestry it becomes the duty of the statesman and the legislator to step forward, though he cannot compel men to act for their own or the public good, save, perhaps, trees along the highway. It is his duty to use all honorable means to insure the welfare of the state of which the public voice has made him for the time the conservator. That this duty should not be unknown to him such organization as this society, the voices of those who have studied these important matters and the public wants, who have made it their daily practice to study forestry in all its different forms of life, tracing effects to cause—these, I say, should have a hearing by ths legislator.

Trees have much to do with the beauties of horticulture. Aside from their value to the crops, true taste in their arrangement increases the beauty of the lawn and the value of the premises. Plant evergreens on the high knolls, which in a few years will be a living land-mark for miles around. Surround every spring and line the banks and windings of creeks with trees, cover unsightly objects with running vines, of which we have an abundance of natives, like the ampelopsis, clematis, etc. Trees and flowers in public grounds are silent educators, and contribute to the physical, mental, and moral health of the public.

The same may be said of railroad stations, which, as a general rule, are located at the edge of the town, but are daily subjected to hundreds of eyes, who, as they pass, take with them a pleasant remembrance of the place from a few trees, a green plot of grass, and a bed of petunias, marigolds, or bachelor buttons at the stations.

At the stations on our western railroads is this ornamentation particularly desirable in districts where there is now not a tree or shrub. Many varieties of trees, shrubs, and plants, which are comparatively new to the eastern traveler, could be brought from the dry regions of the mountains and made to flourish on our western plains. We earnestly call on the Union Pacific Railroad, who can at a small expense make the stations even on the Laramie plains, where now is only seen the sage brush, pleasant to the traveler and interesting to the botanist. There are many new and beautiful plants on the mountains worthy of cultivation. To learn the advantages of horticulture, whether we consider its fruits, forests, or flowers, constant study and careful investigation is daily demanded. Whoever engages in this work will find an increased longing to enter the inner temple of Nature to learn how perfect are her ways in causing plants to grow and flowers to bloom, and thus be led to a higher, holier, and happier life.

The horticulturist, of all men, should be a constant student of Nature—and we speak of nature as that form and vitality which produces different climes and seasons; which clothes her hills and plains with grandeur and beauty, as seen in her forests; which fills all its veins with the pulse of happy life; which covers it with the green glories of spring and the golden glories of harvest; which perfumes it with flowers, and gives us the music of running brooks; which gilds with bars of gold the early dawn, and hangs with drapery the sunset clouds. All this the horticulturist witnesses, and should urge him to labor in a cause which possesses many elements of human happiness.

If God clothes the grass of the field, will he not clothe these vast plains with forests and verdure, if we but use the means so ready to our hand, and increase the welfare of the people both now and hereafter.

PREMIUM ESSAY—THE SUGAR BEET.

BY HARVEY CULBERTSON.

The cultivation of the beet for sugar is comparatively of recent origin. It is but little more than sixty years since the first successful efforts were made, but during this period its development has been rapid. Many sections of France and the German states have been devoted almost entirely to the production of beets for the manufacture of sugar. Many places formerly a barren waste have, under the stimulus of this new industry, been made productive. Beet culture has revolutionized their entire system of farming. At present, though large areas of land are cultivated in beets, it is said that they are able and do produce more wheat and cattle than at any time before the introduction of this new industry.

It was formerly considered that tropical climes held the monopoly of the sugar trade, but the progress of the beet sugar industry within the last half century bids fair to make the temperate latitudes at least equal to the tropical.

The beet is supposed to be a native of Turkey. In the year 1747, Margraff, a Prussian chemist, while analyzing vegetable productions, discovered sugar in considerable quantities in the beet. He advised its cultivation for that purpose. In 1773 Achard, another Prussian chemist, tried various experiments for extracting the sugar, under the patronage of Frederick the Great. But owing to the death of Frederick he did not attempt it again until 1795. In 1799 he presented several loaves of the sugar to the king. The cost of its production was six cents per pound. A committee of French chemists was appointed to examine his process and report its merits. Their report was unfavorable, however, and the enterprise was dropped. About the year 1808 Napoleon I. had his attention called to the feasibility of the manufacture of sugar from the beet. He appointed a new committee to conduct further experiments. M. Deyeux, a member of the committee, made his report in 1810, accompanied with two loaves of sugar equal to the best cane sugar. About this time reports were published in Germany in which 6 per cent of sugar was reported to have been obtained. At this time they were only able to obtain 50 per cent of the juice, and generally only from one to two per cent of sugar, at a cost of thirty cents per pound. This stage of the industry, however, did not continue long. At the time of the continental blockade in 1812—a circumstance favorable to the development of home industries—the cost was reduced to nine cents per pound by the use of improved machinery and the adoption of new methods of extracting and purifying the sugar. To encourage the production and aid in the improvement of machinery and discovery of new methods of extracting the sugar, the French government ordered 100,000 acres of beets to be cultivated, and appropriated $200,000 for the establishment of chemical schools and imperial factories. The sugar was to be exempt from duty for four years. With these inducements five hundred licenses were granted. But political events in 1814 caused the failure of all but one—M. Crespel Delisse—who continued the work. The difficulty being ended, the work quickly revived. The government placed an impost on indigenous sugar of three and a half cents per pound, and on imported sugars a duty of five cents per pound. Under this stimulus new and more effective methods were introduced. The yield of sugar reached 3 and 4 per cent, that of molasses 5 per cent, the cost of manufacture about seven cents per pound. From this time until the present the manufacture of sugar from the beet has been on the increase. Various improvements have been made in all departments of the work; various varieties have been experimented with, and a great increase of saccharine qualities has been obtained by close observation and judicious selection of roots for the production of seed.

To show something of the magnitude to which the manufacture has arrived, we copy the following figures from Grant, of Illinois, who visited Europe with the express purpose of informing himself on the whole subject. The figures are for 1865, and show the amount of foreign and colonial importations, with the home productions:

Colonial importations	76,103	tons
Foreign "	144,083	"
Beet sugar manufactured	270,000	"

It is said that beet sugar is used entirely in the interior of France and Germany, none other being used except in the seaboard towns. To show its growth still further, since 1840 the production has doubled every ten years.

In 1830 the amount of sugar consumed in France was 2 ℔s per head. The beet sugar supplied 90 per cent of it. In 1865 the consumption was 14 ℔s per head, and the beet sugar more than supplied the home demand.

In the German states, the development of the beet sugar industry has increased much faster than that of France. In fifteen years commencing with 1850 and closing with 1865, the production was quadrupled, and at present they stand among the foremost of sugar producing countries.

From some certificates of the United States agricultural report of 1873, we find the production of sugar from the beet in Europe amounted in 1863 to 452,000 tons; in 1873 the product had grown to 1,250,000 tons, being an increase of nearly 200 per cent in ten years. The total amount of sugar produced in the world in 1873 is estimated at about 3,100,000 tons. We see, then, that at the present time, beet sugar constitutes more than one-third of the world's sugar product. Though not directly connected with the subject, the following statistics are given as being interesting in connection with the world's sugar consumption. The figures were originally from a German statistical paper. We get them from the United States report for 1873.

It seems that the Anglo-Saxon race, including England, the

United States and the British colonies, stands at the head of sugar consumers, using 1,142,000 tons annually, or 41.40 ℔s per head. Next the Latin races of France, Italy, Spain, Belgium, Portugal, and Switzerland require 506,000 tons annually, or 12.34 ℔s per head. The Teutonic race of Germany, Austria, Holland, and Denmark consume 262,000 tons, or 7.30 ℔s per head. Finally, the Russian and Ottoman empires and Greece demand only 125,000 tons, or 3.30 ℔s per head. The consumption per head in the United States is greater than that of any other country.

HISTORY OF BEET SUGAR IN THE UNITED STATES.

A few attempts have been made within the last thirty-five or forty years to obtain sugar from the beet. A part of the experiments were made before the improved processes were known. The results up to within six or eight years have not been satisfactory enough to warrant it a paying investment. We believe, however, that it has been more the want of a proper understanding of the manufacture than the fault of the saccharine qualities of the beet; for chemical experiments have shown that the beet is as rich in sugar here as in Europe. The first attempt to manufacture sugar from the beet that we have any account of, was made in 1838-9 by David Lee Child, at Northampton, in the valley of the Connecticut, who was succeeded by the Northhampton Beet Sugar Company. They reported favorably, having obtained 7 per cent of sugar, of good quality. It is stated that they produced 1,000 barrels of sugar. But we hear nothing more of the company; what the reason is we are not informed.

In 1863 Gernet Brothers conceived the idea of manufacturing sugar from the beet. Accordingly one of them went to Europe to study the methods pursued there. On his return they chose the prairies of Illinois to carry out their designs. They purchased 2,300 acres of land and commenced operations. They cultivated a crop of beets, but owing to the condition of the fresh land, dry weather, and imperfect mode of cultivation, only a small crop was obtained. The saccharine qualities, however, were good, showing by analysis 12½ per cent of sugar. They went to considerable expense in fitting up a complete outfit of machinery, but, unfortunately, commenced on too large a scale for their means, and were unable to complete proper preparations. A result of 7 per cent of sugar was obtained notwithstanding the disadvantages under which they labored. Not being able to carry it on themselves, they put it in the hands of a company called the Germania Beet Sugar Company. They produced six hundred barrels the first year.

Their estimate of the profits under fair management, with a capital of $200,000.00, and working up one hundred tons of beets per day are, viz.:

With a yield of 6 per cent gives 73 per cent profit.
" " 7 " " 91 " "
" " 8 " " 109 " "
" " 9 " " 127 " "

We have been unable to learn what they have done of late.

About 1867 a beet sugar factory was established at Fond du Lac, Wisconsin, by Messrs. Bonesteel and Otto, two Germans, who were familiar with the industry in Europe. Their operations were limited, having only about $12,000 capital, the capacity of their factory being only 10 tons per day. But a good result was obtained, having extracted 7 per cent of sugar. They proved by actual experiment that the soil was adapted to the growth of the beet so far north as Wisconsin. They received some beets from California that were very rich in sugar, also some tempting offers to remove their machinery and skill, which they did. There are now two companies in California, one at Alvarado, the other at Sacramento. They have excellent prospects of success. In 1873 they produced an aggregate of 2,000 tons of sugar.

THE SUGAR SUPPLY OF THE UNITED STATES.

From an examination of the late agricultural reports, we find that the production from all sources in the United States is far from supplying the demand since the rebellion. Although the sugar business has been reviving, it has not in any one year reached one-third what it was in 1861. The total sugar product in 1873 was only about 50,000 tons, while the imports from other countries amounted to 636,497 tons. In 1872 the sugar imported was

561,002 tons. The amount exported in 1873 was about 5,000 tons. Thus we see that the production of sugar from all sources in the United States scarcely supplies 9 per cent of the demand. The result is that we pay to foreign countries for sugar alone from 60 to $80,000,000 annually, which is more than we receive from the total exportation of corn, wheat, and flour.

This is a drain on our country which should not be permitted to such an extent, when we have the means of preventing it.

CAN A PORTION BE SUPPLIED BY THE SUGAR BEET?

We see no reason why it cannot. Our soil has been proven again and again as good for beets as France or Germany. The climate is also as well adapted. Analysis has shown that beets can be grown equal in saccharine qualities to those of Europe. The same care in cultivation will produce as large crops, as any European country. Though they have the atvantage in cheap labor, we have advantages in cheap lands, low rents, and in the price of fuel. Taking the estimated profits of the Germania Beet Sugar Company, they are certainly sufficient to warrant success. There are but few things in which one can engage that will give such returns. One difficulty that has prevented its success is probably the large capital necessary to commence operations on a scale that makes the most profitable returns. Another cause has been the want of skilled superintendents in the manufacture. Could something be done in this country as was done in France to get the industry established at public expense, and a school of inquiry and experiments to teach the most effective methods of cultivating the beet and extracting the sugar, we might expect quite a different result. But as a few factories have been established and are doing a fair business, we hope that capitalists will investigate the subject, and make more earnest efforts to have it a success in our country as well as Europe. There is one feature about it that ought to be an inducement to engage in it—that is, while in most other manufactories the home supply is nearly equal to the demand, this one will not be for many years to come.

We give here some figures from Mr. E. B. Grant of Illinois, who has probably investigated the subject as much as any one in the

United States, which will show his estimate of the profits. The estimate is made on a capital of $300,000, $200,000 of which is to be put into machinery and buildings, and $100,000 for working capital.

EXPENSES.

Labor of 225 men 150 days @ $1.75 per day	$ 50,625
24,000 tons of beets @ $4.00 per ton	96,000
Salaries	10,000
3,000 tons of coal @ $1.50 per ton	4,500
Sacks for pulp 8000 @ $1.00	8.000
Bone black waste	7,500
Insurance	2,000
Lighting	750
Other expenses	15,122
	$194,500

RECEIPTS.

1680 tons sugar (at a yield of 7 per cent) @ 8 8-9 cents per pound	$336,000
720 tons molasses (at a yield of 3 per cent) at 4 cents per gallon	7,200
4,800 tons of pulp @ $2.00 per ton equal to hay at $6.00 per ton	9,600
Total receipts	352,800
Less expenses	194,500
	$158,300

Deducting for local taxes and internal revenues $10,000, we have a net profit of 50 per cent on capital invested. This is estimating molasses at 4 cents per gallon, when they are worth 25 cents per gallon for the manufacture of alcohol. In this calculation also 1.8 cents per lb. is allowed more than it costs in France where the actual expense for labor is less than ½ cent per lb., and in everything else we have the advantage of them.

It is estimated that with a yield of 7 per cent of sugar, the expense of producing and preparing the sugar for market will not be more than 5¼ cents per lb.

Grant says that after making all possible deductions for contingencies that may arise, with a yield of 7 per cent there will be a profit of 80 per cent.

PROCESS OF MANUFACTURE.

It is impossible in the narrow limits of an essay to give any extended remarks or details on this important subject. There are various ways and processes of which we will select some of the later and more improved.

When the beet has been prepared by trimming off the tops and useless parts, it is thoroughly washed in vats made for the purpose.

They are then ready for the slicing or rasping machine, the latter of which is in more general use.

The beet being reduced to a fine pulp is put in coarse woolen sacks and submitted to pressure in a screw press, to separate the juice; after it is removed from the screw press it is often placed in the hydrostatic press to remove as much as possible of the juice. Sometimes on removal from the screw press, the cake is broken up, water is poured on, then again put in the press.

The method of extracting the juice in one of the California factories is quite different. Their rasp is a cylinder revolving 1500 times per minute. From the rasp the pulp falls to what are called centrifugals below. Of these, in this particular factory there are ten revolving at the rate of 1200 times per minute. By this rapid motion the juice is thoroughly separated by passing through very small holes in the side of the machine, on the same principle that honey extractors separate the honey from the comb. As being simple as any, we give the process as followed in this factory:

The juice from the centrifugals passes to the defecating pans or purifying pans. The dry pulp goes to the pulp room. In the defecating pans the impurities are removed by a preparation of lime. The juice is run into two upright boilers on the first floor. It is then elevated from these to the filter presses on the second floor by steam. Passing into what are called saturating pans, where the lime previously absorbed is eliminated by an infusion of carbonic acid gas, it is then filtered through animal charcoal to free it from its impurities. From the filter the juice passes to the evaporating pans, where it is boiled until it is of a proper consistency for the sugar to crystalize. It is then drawn off into large iron tanks to cool and crystalize; when it is put into an upright cylinder in which an axle with projecting arms slowly revolves, mingling the mass into a sort of thick molasses. This syrup is put into rapidly revolving sugar centrifugals; as they revolve the syrup passes through the sides of the machine while the sugar remains. The first process gives first-class sugar. The syrup that was expelled the first time is put in other centrifugals from two to three times, each time giving a poorer quality of sugar.

THE DIFFUSION PROCESS.

This new process was invented by Mr. Julius Roberts, an Austrian, and is said to be a great improvement.

Instead of the beet being rasped to fine pulp and pressed, they are cut into thin slices and put into a number of vats, which are connected by pipes running from the bottom of one to the top of the next succeeding. Water of certain temperature, and proportioned to the weight of the beets is mixed with the material in the first vat, and allowed to remain until it has dissolved half of the sugar in the beet, or until the saccharine qualities of the water and beets are the same. If the roots contain ten per cent of sugar, the water is allowed to remain until five per cent is extracted. The water is then allowed to run into the second vat, and remain until it has equalized the sugar in the roots to itself, when the water would contain 7½ per cent of sugar. It is then allowed to run into the next vat, where a similar process takes place. Returning to the first vat, containing 5 per cent of sugar, fresh water is added, and allowed to remain until it has taken out one-half of the remaining sugar, when it is passed into the second, and so on. By this process it is considered entirely practical to extract the sugar to within one half of one per cent. It is claimed that by this method of extracting, the material is much purer than when the roots are grated into pulp and the juice pressed out. By this method also, much labor is saved, the large and expensive presses are done away with, and hence much less motive power is required.

This whole process has been well tested by several factories in different countries of Europe, and is no longer a question to be proven by experiment before it comes into general use.

COST OF PRODUCING BEETS.

The cost of producing varies much under different circumstances. I shall give below in table form:

The cost per acre and ton of beets, taking the statistics from different sources. In the calculation we leave out the cost of manure and fertilizers, and leave out names and places, as they take up too much space:

Cost per Acre.	Tons.	Cost per Ton.
$48	19½	$2.50.
48	17¼	2.75.
22	17	1.30.
42	34	1.25.
36	20	1.80.
14	22	65.
57	49½	1.15.

We might give many more but the result would not be changed. We do, however, think that these figures are far more than could be obtained on an average. They are taken from reports here and there, and it is very likely that only good yields were reported.

In France the average yield is considered in some places at 20 tons per acre. In Germany from 10 to 25 tons per acre. Crops of beets have been raised of 60, 70, and even 90 tons per acre, but it seems to be much more common to obtain from 10 to 20 tons.

With a cost per acre equal to the above we think that 20 tons would be realized in most cases, with fair advantages, in Nebraska. In France the average price per ton of beets for a number of years has been about $3.50. We think these would be paying rates for farmers here, had we the factories to deliver them to. It would certainly pay as well as wheat or corn.

WILL IT PAY TO RAISE THE SUGAR BEET IN NEBRASKA?

After examining the meteorological reports of France, and comparing those of Nebraska with them, we feel convinced that Nebraska is equal if not superior to France.

The beet, to produce the most sugar, requires the rainy season to be in the early period of their growth, or when the leaves are growing, and the remainder of the season, or when the roots grow the most, to be dryer, which favors the sugar qualities of the beet. Our soil is also so retentive of moisture that drouth will not likely injure them. We saw them grow in 1874, as dry a season as we ever have, and they did well considering the circumstances in which they were placed. Prof. S. R. Thompson, of the Agricultural College, states that in 1872 some beets were planted on the college farm, which produced at the rate 20½ tons per acre, of the White Silesian variety. Some of these were placed in the hands of Prof. Aughey, of the University, for analysis. The average result was 13.5 per cent of sugar. We give the following, as taken from the report on the analysis of the different varieties of beets raised on the college farm:

Variety of Beet.	Percentage of Sugar in juice.
I. Vilmorin,	15.50
II. Vilmorin,	15.61
I. White Imperial,	14.20
New Imperial	13.80
I. White Magdeburg,	13.10
Quedlinburg,	13.44
II. White Imperial,	10.27
II. White Magdeburg,	10.06
White Silesian,	9.72
III. Vilmorin,	9.93
Long White beet,	8.60
White Sugar beet,	7.20
Vienna Red beet,	8.10

These figures, with others that might be obtained, show that our climate and soil are well adapted to the growth of the beet.

There are many advantages which the Nebraska farmer would have over his present condition, were the manufacture of sugar from the beet instituted. In our present condition we are dependent on the raising of grain. The railroads take at least one-third of what we can obtain for it in Chicago, our principal shipping point. Under the present system of farming our land is bound to deteriorate in production. The cultivation of the beet would not be so injurious to the soil; it would be kept cleaner of weeds; the ground would be cultivated deeper; refuse beets and beet pulp or press cake would be fed to stock, and the manure returned to enrich the soil. One of the greatest advantages would be giving of work to our farm hands during the winter months, when they usually have to pay their board or work for board alone. Could they obtain work their circumstances would be greatly improved. As the number of skilled workmen necessary in a sugar factory is small, the greater part of the work could be done by ordinary farm hands.

The adaptation of the beet to our soil will be seen by reference to the kind of soil in which it grows best.

SOIL.

As the beet root is long and penetrates deep into the soil when in good condition, it is necessary to have a soil that can be easily made permeable to the root. A clay soil is good if not too tenacious. A sandy soil or heavy loam is excellent. A considerable mixture of clay seems to be beneficial. We have seen them grow better on a clay point or hillside than on the level where the ground was in a much better condition and seemed to be richer. It should be free from gravel or stones.

The best color of soil is probably black or brown providing the color is not the result of some mineral elements that would be injurious. Soil containing much saline or alkaline matter is unfavorable to the cultivation of beets, especially for sugar. These elements are a positive injury in extracting the sugar, making it a more difficult process. For stock feeding this objection is of less importance—a small portion may be even beneficial.

The soil should be well drained either naturally or artificially. Wet marshy lands are unsuitable. The soil of Nebraska in this respect is well adapted to beet culture. It is naturally well drained, drying soon after rains and retaining moisture well during drouth. Some of our fine, sandy alluvial bottom lands that overflow at times will produce the largest yields.

The soil should be free from weeds, coarse manure, and sods, as they hinder the tap root in passing downward and are apt to produce rough, sprangling beets, instead of straight, smooth and uniform ones.

Having chosen a plot free from all these objections, plow it in the fall just as deep as it can be—12 to 16 inches all the better though less will do. If any manure is to be put on, it should be well rotted and plowed in with the first plowing. In plowing the stiff subsoil should be turned well up to get the action of the frost and air. In the spring pulverize it thoroughly with the harrow. Just before planting plow again as deep as before, and make mellow again with the harrow. If the ground has not been plowed in the fall, it should be plowed very early in the spring, then treated as though it had been fall plowed. Whatever work may be necessary to render the soil loose and mellow, 12 or 15 inches deep should be given, as it will be so much labor saved in after cultivation. It is much easier to make mellow when there are no plants to obstruct the cultivator than afterwards. Unless the ground is thoroughly and deeply worked, the beets will grow too much above ground; for sugar purposes the part above ground is useless.

PLANTING.

Having the ground well prepared, planting should begin the last of April or first half of May. It may be done by hand or machine. Usually hand planting will be out of the question. The garden seed drill will do very well where only a few acres are planted. With this machine two persons can plant an acre in three hours. Where several acres are to be planted the common grain drill may be made to plant by removing such hoes as will be necessary to make the rows the requisite distance apart; and put divisions in the seed box to economize seed. Where neither of these machines can be had, a very cheap arrangement can be made by taking a common tin fruit can; fix it on a handle about four feet long; make a hole in the can large enough for the seed to run out at the required rate when shaken over the row.

The seed generally requires some preparation before planting. The seeds are of various sizes, and what appears to be one seed is often two or three. To prepare the seed so that it will run out of the machine evenly, put it into some kind of vessel; take an inch board three or four inches broad, with a square end, and champ them a few minutes; then blow out the dust and screen them; break the large ones and screen again.

To facilitate the growth, the seed is sometimes soaked five or six hours in a solution of sulphate of potash and sulphate of lime, four ounces of each dissolved in about two quarts of warm water; then add two gallons of cold water. Take sufficient to cover the seed. When soaked the required time drain off the liquid.

To dry it mix thoroughly with ashes, lime, plaster paris, or guano, so that each seed will have a coating; let dry until it will pass easily out of the drill.

Where the cultivating is to be done largely by horses the rows should be about 30 inches apart. The amount of seed required at this distance is from four to six pounds per acre; better have plenty, as it is much easier and better to thin out than re-plant. Plant about one and one-half inches deep, and in straight rows, so that horse cultivating can be the easier done. In about ten days from planting, more or less, according to the condition and warmth of the soil, they will appear above ground.

CULTIVATION.

Shortly after they make their appearance the war upon weeds should begin. The ground must be kept clean and stirred deep. To cultivate deep enough and not cover the tops requires a cultivator made on purpose. A very good one can be made by taking two of the hoes from a common grain seeder, and bolt them on to something like a plow-beam; put in a couple of handles, and you have a cultivator that will run deep and loosen the soil close to the root without covering the tops. When the beets are about one quarter of an inch in diameter they should be thinned. This may be done by first going through with a hoe, and cutting out the spaces; then follow by hand, leaving but one plant in a place. When grown to feed stock they may be left from 12 to 18 inches apart, but for sugar ten inches apart will be sufficient, as small roots are richer in sugar than large ones. As they advance in growth the roots begin to grow above the ground; the work of drawing the soil around them should be commenced, and kept drawn up to the crown of the beet, as the part that grows above ground, exposed to the air and sun, contains acids injurious to the sugar. In some places in Europe the part that grows above ground has to be taken off before it goes to the factory. Generally, if they have been planted soon enough, cultivation will have to stop about the first of July, except the use of the hoe occasionally to cut scattering weeds. At this time the leaves become so large that they are easily broken off. But should we have a heavy-beating rain about this time another cultivation would be advisable if some of the leaves were broken, rather than have the ground as hard as it gets after some of our heavy rains. We think that a better result will be obtained by keeping the ground loose, even if it is at the expense of a considerable number of leaves. The root will not be so likely to grow above ground nor suffer from drouth.

The number of times that they should be cultivated depends upon the condition of the ground and thoroughness of the work; three or four times may be sufficient, but five or six must be given if found necessary. There is a proverb in Germany that the "hoe is the gold of the beet."

HARVESTING.

The time of harvesting varies with the climate, season, soil, and cultivation; generally, however, about the first of September. When ripe the leaves, instead of being a healthy green, are a light yellow. When they assume this color they may be harvested or let remain for a time in the ground; if wet weather should set in they will be better harvested, as new leaves will be formed at the expense of the sugar.

If the ground is dry and no danger of frost, it is thought best that they should remain in the ground for a time. While in the ground it is said they will endure a temperature as low as 24° Fahrenheit without injury. Should they be injured by frost, they will often recover if allowed to remain in the ground about ten days longer.

They may be dug with a spade, fork, or plow. Where they carry on the business extensively, they have plows made on purpose for turning them out. The common plow, however, may be made to answer very well, plowing a deep furrow close to the row, when they may be easily pulled out by hand. As they are pulled, place them two rows in one so that a wagon may pass through; place the tops all one way. Then with a long knife pass along the row and cut the tops off pretty close; if to be made into sugar, cut off with the top the part that grew above ground. They are then ready for the factory or pit.

PRESERVATION.

There are various methods of preserving the beet. Some producers putting them in large piles without any ventilation; others are very particular to have the pits not above a certain size and thoroughly ventilated.

It is said that some of the factories in France pile them in immense piles covering acres and six or seven feet deep without any ventilation, and they come out all right. This, too, is in a warm climate. It would seem to us that our dry cold winters would not injure them when not ventilated. Mr. Grant states that the best method of preserving is to keep them frozen solid. This means of course where they are to be made into sugar. The frost seems to break the cells and makes the roots easier worked. The saccharine qualities are not injured providing they are worked up when thawed out.

The method generally recommended in beet growing districts is to place them in pits as soon as dug. Select a dry place on a slope; dig a trench about 10 feet wide, and 15 or 20 inches deep, leaving it higher in the middle than at the sides, and any desirable length At the edge a narrow trench is to be dug about six inches deep to drain the bottom. The beets are put into the trench, placing the outside row with the hand one by one evenly with the crowns outward. They may be put in from six to eight feet deep. As the pile is completed the earth is to be thrown up; at the bottom it may be thrown up sufficient for winter protection, but the top should have a thin covering at first, and increased as cold weather approaches.

Another method by which they are ventilated, is to put them on top of the ground. But first dig a trench in the middle a little longer than the pit. This is to be about two feet wide and about 20 inches deep. It is covered with narrow boards, placed so that the beets will not fall through. From this make chimneys every 8 or 10 feet to the top of the pile. The piling and covering is the same as the preceding one. A pit constructed in this manner possesses the advantage of being able to control the temperature of the pile, which should be about 40°. In each end of the trench straw is placed to control the draft through the pit, should it become too warm the temperature may be reduced by closing the trench during the day and opening it at night for the cold air to pass through. The chimney may be made by nailing together some rough boards or taking poles and wrapping straw around them.

Other methods of pitting may be used as best suit the convenience of the grower. Whatever method is taken, all precautions should be taken to keep the pit dry, as wet and moisture tend to produce heat, and injurious chemical changes. In those climates where there is considerable rainfall in winter special pains will be necessary to drain away the surface water. Where it is expected the pit will be opened often, as for feeding stock, one end should be covered with straw. For stock-feeding, cellars are more convenient than pits. To keep them best, it should be a cellar where heat will not be necessary during winter, as they have a endency to wither under such treatment and will not be relished by stock, or grow as well for seed.

SEED.

The selection of beets from which to grow seed is an important matter. The saccharine qualities have been greatly improved by proper care. The Germans have taken the lead in this matter. As their government imposes a tax on the beet, they have endeavored to make it as rich as possible in sugar. They select the beets while growing in the field. They choose medium sized ones growing in moderately rich soil, where it has not been manured, selecting those that grow entirely beneath the surface and shaped lik a pear, one whose crown is single and has no hollow, the longitudinal indentations on the beet to incline to a spiral rather than straight direction. The foliage must not be too luxuriant, bu grow close together.

There is a method practiced in Europe to some extent of selecting by specific gravity. To test them they are first washed, then all that float are rejected. Three or four vessels containing brine of different densities are prepared. The beets are placed in the weakest first, and so on according to the order of their densities rejecting each time those that float, and taking only those tha sink in the strongest.

The beets that have been selected in the field should be carefully dug when ripened and pitted. To preserve them best they should be put in layers, separated by clean soil. They must no be kept where they will wither, as many of them will not grow and those that do will be weakly. When dug the tops should b cut off an inch or more from the beet.

The beets should be planted in April, the soil to be prepared a for the common crop. Make drills some three or four feet apar with a plow, then with the spade dig holes about two feet apart i the rows, deep enough for the crown of the beet to remain just beneath the surface. In covering the soil should be pressed aroun them. When they make their appearance above ground cultivation should begin and be done thoroughly.

The crop is harvested the latter part of August or first of September, while the tips of the shoots are still green. When cut le it remain in the sun or some place where it will dry. When cure it should be threshed and the seed put in sacks and hung up i some dry place. Seed well taken care of, that has not been allowe to get wet, is considered good from three to five years. Some cu tivators prefer two-year old seed to fresh for sugar.

FERTILIZERS.

Though it will probably be some time before artificial fertilize will be much used in the west, we may make good use of suc manure as we have. It should be an object of every farmer to keep his land as good as he obtained it, if not to make it better. But with our present system of waste and carelessness in this respect our land will of necessity grow poorer.

For the beet a good soil is necessary. Common stable manure, well rotted, is excellent. When it is put on the ground fresh, one year had better elapse before planting to beets, as it would be likely to stimulate them to a vigorous growth and not give a corresponding growth in saccharine qualities. In Europe sheep and hog manure is not considered very good unless put on the crop preceding the beets. The difficulty seems to be that they stimulate the accumulation of injurious salts.

Any manure having a basis of potash is considered excellent. Bone dust, superphosphate of lime, and guano are good fertilizers. The soda chlorides are also excellent.

We give an analysis of a ton of beets below, showing the number of pounds of the different elements in the roots and leaves, from some English chemists:

	Roots ℔s.	Leaves ℔s.
Potash,	4.99	7.86
Soda,	3.02	2.52
Lime,	.41	3.31
Magnesia,	.43	3.27
Oxide of Iron,	.12	.52
Phosphoric acid,	.66	1.94
Sulphuric acid,	.65	2.20
Silica,	.54	.76
Chloride of soda,	5.29	12.82
	16.11	35.20

Making a total of solid matter for every ton of beets of 51.31 ℔s.

STOCK FEEDING.

Although it may be sometime before much sugar is made from the beet here, it should be cultivated for feeding stock immediately. Our eastern stock raisers and dairymen will not do without their turnips, rutabagas, mangels and beets. The turnip with us is uncertain, but the beet grows well. The value of root crops, for feeding, according to the testimony of the best feeders, ought not to be overlooked. They are nutritious, but their value is not based on the elements they contain. Stock, fed roots, with their other feed, keep healthy and thrive better. They affect them something after the manner of grass. During our long winters, and especially early spring, all stock need something besides dry hay and corn to make them thrive. We hope to see our farmers engage in the culture of beets. Every one ought to have an acre or more for feeding purposes. Then, when it is fully demonstrated by experience to every one that they will grow, we may hope to see our system of farming revolutionized by the introduction of beet sugar factories.

AWARDS

MADE BY THE NEBRASKA STATE HORTICULTURAL SOCIETY AT STATE FAIR, SEPT. 8TH, 9TH, 10TH, 11TH, AND 12TH, 1879.

CLASS 1.—GREEN FRUITS.

Lot 2.—Apples.

Best collection apples, Nebraska City Agricultural Society.
" " winter apples, Otoe County Pomological Society.
Second best, Hiram Craig.
Best autumn apples, Cass County Agricultural Society.
" summer apples, Nebraska City Agricultural Society.
" crab apples, Hiram Craig.

Lot 3.—Pears.

Best winter pears, B. E. Peck.
Second best, Burches & McLaughlin.
Best fall pears, " "
Best collection pears, Burches & McLaughlin.

Lot 4.—Peaches.

Best collection of peaches, S. S. Griffin.
" seedling, G. F. Warren.

Lot 8.—Quinces.

Best 12 quinces, Nebraska City Agricultural Society.

Lot 9.—Grapes.

Best collection grapes, Hiram Craig.
" Delaware, Concord, Diana, Martha, Hartford, Clinton, Worden, Elvira, Cottage, five bunches each, Hiram Craig.

Best 3 varieties for market, H. Craig.
“ “ “ table, “ “
“ native grapes, John Neal.

Lot 10.—*Canned and Preserved Fruits.*

Best canned apples, H. P, Vose.
“ “ pears, Jennie A. Peck.
“ “ peaches, J. B. Wood.
“ “ cherries, Asylum farm.
“ “ pie plant, Ella S. King.
“ “ plums, G. Russell.
“ “ gooseberries, Mrs. A. C. Zeimer.
“ “ crab apple, Jennie Peck.
“ “ strawberries, Jennie Peck.
“ “ tomatoes, Asylum farm.
Best collection canned fruits, Jennie A. Peck.
Best preserved apples, Mrs. M. A. Hovey.
“ “ pears, “ “ “ “
“ “ apricots, Mrs. A. C. Zeimer.
“ “ strawberries, “ “ “
“ “ quinces, “ “ “
“ “ cherries, “ “ “
“ “ elderberries, “ “ “
“ “ crab apples, Mrs. M. A. Hovey.
“ “ watermelon, “ “ “ “
Best sweet pickles, Asylum farm.
“ tomato catsup, J. F. Adams.
“ apple jelly, J. S. Hermance.
“ pear jelly, Mrs. M. A. Hovey.
“ crabapple jelly, “ “ “
“ raspberry jelly, Mrs. F. G. Fuller.
“ grape jelly, “ “ “ “
“ peach jelly, H. P. Vose.
“ plum “ “ “ “
“ wine plant, E. Shugart.
“ gooseberry, H. P. Vose.
“ collection jellies, Mrs. A. C. Zeimer.
“ peach butter, “ “ “ “

Best apple butter, Minnie Peck.
" sweet corn, May S. King.

Class 2.—Floral.

Lot 1.—*Pot Plants.*

Largest collection green-house plants, W. J. Hesser.
Second " " " " Peter Murray.
Best Aloe and cactus, W. J. Hesser.
" Foliage plants, "
" New and rare plants, "
" Coladiums, "
" Coleus, "
" Ferns, "
" Geraniums, "
" Roses, "
" Palms, "
" Begonias, Peter Murray.
" Carnations, "
" Fuchsias, "
" Petunias, "
" Rustic filled with plants, "
" Hanging baskets, "
" Tuberoses, "
" Aquarium, "
" Oleanders, Geo. McLean, Jr.

Lot 2.—*Cut Flowers.*

Best Display cut flowers, Peter Murray.
" Floral design, "
" Round bouquet, "
" Collection roses, W. J. Hesser.
" Basket cut flowers, "
" Verbenas, "
" Dahlias, Geo. A. Wright.
" Flat bouquet, Mrs. J. F. Lansing.
" Flower wreath, Geo. McLean.

Best Herbarium, Miss Hattie Childs.
" " Nebraska plants, Jessie Allan.
" Everlasting flowers, Miss M. Park.

Lot 3.—For Amateurs only.

Largest display Greenhouse plants, Geo. McLean.
" Geraniums, "
" Coleus, J. T. Allan.
" Hanging baskets, Miss M. Parks.
" Cut flowers, Mrs. J. Doolittle.

Lot 4.—Nursery Stock.

Best Display Ornamental stock, S. Barnard.
" Fruit trees, "
" Evergreens, Peter Murray.
" Osage plants, E. F. Stephens.

CLASS 3.—VICKS' FLORAL PREMIUMS.

Best collection cut flowers, Mrs. J. Doolittle.
Second " " Mrs. J. B. Skinner.
Best ornamental floral work, Mrs. J. Doolittle.